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THE INSECT PEST SURVEY  
BULLETIN

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# INSECT PEST SURVEY BULLETIN

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## THE SPECIES AND DISTRIBUTION OF GRASSHOPPERS IN THE 1937 OUTBREAK

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The year 1937 was the fourth in which grasshoppers were collected in typical environments in the several States included in the annual grasshopper survey. Data from the 1934, 1935, and 1936 collections were published as supplements to the Insect Pest Survey Bulletin as follows: Nos. 9 in volume 14, 5 in volume 16, and 3 in volume 17, respectively.

The present report is based on data from collections made in 17 States, namely, Arkansas, Arizona, Colorado, Iowa, Kansas, Michigan, Minnesota, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Utah, Wisconsin and Wyoming. These collections totaled 175,022 specimens. All were determined as to species or were classified undetermined as nymphs and other forms, and then counted. This represented an immense amount of work and should be credited to F. E. Skoog, field assistant, who had charge of the work of identification.

In a task of such huge dimensions there are bound to be weaknesses. The chief criticism has been the fact that in some places where several species occurred in large numbers whose seasonal histories do not coincide, collections made late in the summer do not show a representative number of the adults of the earlier species. To be more accurate in this respect, collections should be made several times between July 1 and September 1. Another weakness has been the fact that a few of the important species are more agile than are the collectors. Dissosteira longipennis Thos. does not appear in the collections in numbers representative of its abundance in the areas where it was the dominant species. Notwithstanding these weaknesses, it is believed that these data will have their place in a study of the grasshopper populations.

All of the 24 States located west of and including Michigan, Illinois, Missouri, Arkansas, and Texas experienced light to very severe infestations of grasshoppers during the summer. The most severe and widespread damage was done to small grains in eight counties in the northeastern quarter of South Dakota and to crop and range grasses in the entire southeastern quarter of Colorado. Severe damage was done to cotton in Texas and Oklahoma and spotted but severe injury occurred in corn, alfalfa, and small grains in other States. Over the entire area the total crop loss was estimated as being between one-half and one-third of the loss in 1936. Outside of this area, Indiana, Tennessee, Alabama, Mississippi, Florida, and other States reported either increased numbers of grasshoppers or minor outbreaks.

In the great wheat areas of the Plains States Melanoplus mexicanus Sauss. was by far the most important species. In areas of greater rainfall, such as the Corn Belt, where farming is more diversified, other species such as M. differentialis Thos., M. bivittatus Say, and M. femur-rubrum Deg., equaled or outnumbered M. mexicanus in many places. Camnula pellucida Scudd. was dominant in northern Michigan and Wisconsin and in parts of Oregon and California. In many parts of the area M. packardii Scudd. was also recorded as being numerous and important. M. differentialis was dominant, for the first time in history, in a part of Montana, namely, in Richland County, in the eastern part of the State. Before 1932 there had been no record of this species in the State. It spread from the southwestern quarter of North Dakota, east of the Badlands, where it was numerous in 1931, 1932, and 1933, and appeared for the first time near Glendive, Mont.

Another important feature of the outbreaks, during the last 4 years, was the increase in numbers and importance of Melanoplus femur-rubrum in practically all of the States and the development of a specific area of this species embracing north-central and northeastern Iowa, south-central and southeastern Minnesota, the southern half of Wisconsin, and part of northern Illinois. The most spectacular and publicized affair was the great outbreak of Dissosteira longipennis, which included all of southeastern Colorado, the extreme western part of Kansas, the Panhandle of Oklahoma, the northwestern counties of the Panhandle of Texas, and the extreme northeastern counties of New Mexico.

There was some hatching of Melanoplus mexicanus and M. bivittatus before May 1 and in southern Arizona as early as February 15. In many localities spring rains and cool weather delayed hatching from 2 to 3 weeks. Melanoplus differentialis and M. femur-rubrum were from 2 to 3 weeks later in hatching than were M. mexicanus and M. bivittatus. Over the entire area there were many places where the hatching of fall eggs of several species was prolonged up to the middle of July and the first of August. Dissosteira longipennis in Colorado and elsewhere started hatching the second week in May. Late hatching of some species in parts of the area delayed the necessity of control work until the latter part of July. This was caused by cool, rainy weather throughout June and part of July. Ninety percent of the poisoned bait used in Minnesota was distributed after July 26. Over the entire area these early rains delayed grasshopper activity.

A nymphal survey in May and June showed newly hatched nymphs to be congregated in restricted areas. On the range in Colorado the third week of May Dissosteira longipennis was observed in bands covering from 40 to 320 acres, and from 50 to 500 per square foot. These were in the first instar and were already migrating and spreading. If scattered over from 10 to 100 times their original hatching areas the population would still have been 50 per square yard, which is a very heavy infestation. One concentrated band observed at this time, if spread over an area of 50 square miles, would have populated it at the rate of 50 per square yard.

In the last week of May heavy concentrations of Melanoplus mexicanus and M. bivittatus occurred in alfalfa, pasture, draws, creek bottoms, stubble, and field margins. Some of these concentrations ranged from 300 to 500 hoppers per square yard. At that time there had been no general movement of these species to other crops from the breeding grounds. In South Dakota only 1 out of 5 to 10 fields near Huron was at first involved, because the infestations were spotted.



Well-tilled fields were at first free of hoppers. These spotted, very dense infestations spread over a wide territory adjacent to their original hatching ground. One quarter section of seedling alfalfa in this area had a population of 250 per square yard over the entire field. These hoppers could have consumed all of the grain in 3 or 10 sections.

In both the Huron and Winner areas of South Dakota many of the grassy headlands suitable for egg deposition of Melanoplus differentialis and M. bivittatus had been covered by blown soil and changed to hummocks of sandy loam covered with Russian-thistle. This condition was well suited for the egg deposition of M. mexicanus and in these places this species hatched in considerable numbers. An environmental factor suitable to certain species had been changed to one suitable for another. The fact that grasshoppers are important factors in soil blowing in South Dakota is now generally recognized. Most of the grain-fields destroyed in the eight counties in South Dakota started blowing as soon as the hoppers had taken off the grain.

There was a period of cold, rainy weather during the first 3 weeks of June. This retarded the nymphal development, and in northern Iowa, northern Montana, northern and northeastern Wyoming, and elsewhere destroyed from 25 to 50 percent of the newly hatched nymphs. It also delayed and seriously interfered with the baiting programs. Considerable bait was wasted by distribution under unfavorable conditions. For example, in one area farmers were spreading bait at 4 a.m., when the air temperature did not reach 70° F. until 10 or 11 a.m. This allowed the bait to dry out before the hoppers were ready to eat it. During such unfavorable conditions for baiting, there is still a gradual spread from the hatching areas without the opportunity to check it. Prolonged hatching aggravates the situation by increasing the number of bait applications necessary and adds a discouraging note to the whole program. In some instances first-instar individual of Melanoplus mexicanus were found together in the same field with the gravid females.

The first record of adults was received from southwestern Oklahoma where 50 percent of Melanoplus mexicanus were adult by May 22. Oviposition by this species started July 1 and a second generation began hatching July 20, with adults appearing again by September 1. Egg deposition by this second generation began on September 20 and continued into November. In many localities in South Dakota, Nebraska, Kansas, Oklahoma, Missouri, Iowa, and other States this second generation occurred in numbers of 15 to 100 per square yard in alfalfa, stubble, and along field margins. These infestations actually developed into secondary outbreaks being especially injurious to newly sown winter wheat and necessitating control measures to protect crops. The State of Nebraska, recognizing this condition and desiring to protect crops from this second generation, went so far as to add 25 percent to the quantity of bait estimated from the fall egg survey as needed for control in 1938.

By June 20 a few adults of Melanoplus bivittatus were present, together with all instars. At this time M. differentialis and M. femur-rubrum were still in the first three instars. Melanoplus bivittatus started ovipositing after July 15 and M. differentialis about September 1. From then on until the middle of November, there was an almost continuously favorable period for egg deposition in most of the infested region. There was also plenty of green food for the development of eggs within the females.

During the summer there were fewer flights recorded than in 1936, which was probably due to the cooler weather and better food conditions. In the Dissosteira longipennis areas this species was migrating by foot or wing from hatching time until the females had settled down to egg deposition. Some 3 or 4 million acres were involved in Colorado alone. Melanoplus mexicanus spread over 33 counties east of the Missouri River in South Dakota from the 8 counties in the northeastern quarter and from local infestations; however, for the most part, migrations were from breeding grounds to adjacent crops.

Generally speaking, disease, parasites, and egg predators apparently did not reduce populations to any great degree during the summer. In some areas sarcophagid flies were a minor factor. During the egg survey bee fly, blister beetle, and carabid larvae were numerous, with from 40 to 70 percent of the egg pods attacked in some places in Missouri, Iowa, and Minnesota. Fungus disease occurred only occasionally.

Eggs of all species were, in general, easily found and well distributed over the entire region. In a few States, including Montana, Wyoming, Illinois, Kansas, and Nebraska, infestations are equal to or somewhat less than last year (1936). In many of the other States infestations are more widespread and more severe than they have been for several years. They increased in northern Michigan, all of Wisconsin, and in the southern half of Minnesota. The most severe infestations were found in Iowa, northern Missouri, and east of the Missouri River in North Dakota and South Dakota. Egg pods of Melanoplus differentialis ranged from 25 to 100 per square foot in many places in Iowa and Missouri. Other species were also numerous. One of the most startling facts was the finding of egg pods, mostly M. mexicanus, at each of 266 stops made in 33 counties east of the Missouri River in South Dakota. At 264 of these, 5 square-foot samples were taken from within each field, or a total of 1,320 square-foot samples. Egg pods were found in 1,238 of them, or in 15 out of 16 square-foot samples. In southern Wisconsin egg pods of Melanoplus femur-rubrum ranged from 4 or 5 per square foot in upland pastures to 6 or 8 in the bottom lands.

Infestations increased in the delta section of Arkansas, over most of Oklahoma, and in from 60 to 80 counties in northwestern, northern, and central Texas. In northeastern New Mexico there were 400 or 500 egg beds of Dissosteira longipennis from 4 to 10 acres in size, with from 8 to 30 pods per square foot. The average infestation in Arizona was about the same as in 1936, although there were shifts within the State.

In Colorado D. longipennis commanded the most interest. In the spring of 1937 it was estimated that 3,400,000 acres was infested at hatching time in 8 southeastern counties, whereas in the fall it was estimated that there were 4,025,760 acres of breeding areas in 12 counties, only 4 of which contained egg beds in the spring. Eight new counties became infested by D. longipennis during the season, while four of the counties having infestations last year were not included in the area in which egg beds were found in the fall. Owing to the great migrations of adults the infested area was almost directly west of where D. longipennis hatched the previous spring. Other species were also abundant in the irrigated sections of the State.

The adult survey indicated that there would be some outbreaks in Idaho, Utah, and Washington in 1938. Grasshoppers were also on the increase in widely separated parts of Oregon threatening serious damage in 1938.

#### The Nymphal Survey in 1938

The nymphal survey in the spring of 1938 more than bore out the predictions made from the adult and egg surveys in 1937. Enormous numbers of Melanoplus mexicanus hatched out in stubble, peppergrass prairie, and in idle or reverted lands in the Dakotas. From 1,000 to 8,000 per square yard were present in many places. Dissosteira longipennis first appeared in numbers as great as 10,000 per square yard. Generally speaking, rains and inclement weather delayed and prolonged hatching over the entire area.

The enormous number of eggs deposited during the fall was due to the prolonged favorable period for egg deposition. In the areas infested by Melanoplus mexicanus and M. differentialis the rainfall for the months of September, October, November, and December was about 50 percent of normal, and the favorable fall conditions permitted an unusual population increase through the development of a second generation, hatching late in July and in August, which reached maturity and deposited eggs. The first nymphs of the second generation were observed on July 20 and favorable oviposition weather continued until November 15, a period of approximately 130 days. This was ample time for the second generation to mature and oviposit, as is shown by the following record of a female M. mexicanus reared at room temperatures. The total span of life for this female was 108 days, 36 of which were required for nymphal development, 37 days from last molt to deposition of first egg pod, and 35 days from first to last egg pod deposited, in which period 10 pods containing a total of 197 eggs were laid.

In addition to the following detailed tabulations of the collections by States, a list is given for each State showing the five species indicated by these collections to be the most important in each habitat.

#### ARIZONA

Of the 1,020 specimens collected Melanoplus mexicanus was the most numerous and M. femur-rubrum was second. This is not a large enough collection to be representative of the relative numbers of the different species occurring in the State. Although there was a more general distribution of grasshoppers reported in the agricultural counties than in any previous year, the infestations were not severe or extensive.



Distribution by species of 1,020 specimens collected in Arizona, expressed in percentage of total number collected in each habitat

Species	:Small:	:Road-:	:Environment:	:Weedy:	:Miscell-:	Total	:Percentage of
	:stems:	:side:	:Range:	:patches:	:aceous:	:specimens:	:grand total
	:	:	:	:	:	:Number	:
Anlocara elliotti Thos.	--	--	--	2.33	--	2	0.20
Ageneotettix doorum Scudd.	--	--	--	--	1.49	1	0.10
Brachystola sp.	0.19	--	--	--	--	1	0.10
Camula pellucida Scudd.	0.75	--	10.20	--	--	9	0.88
Conozoa carinata Fehn.	1.12	8.57	--	9.50	--	17	1.67
Cordillacris crenulata Brun.	--	--	--	--	2.99	2	0.20
Discesteira carolina L.	--	2.86	--	2.33	5.97	7	0.69
Melanoplus bivittatus Say	--	--	--	5.81	--	19	1.86
Melanoplus differentialis Thos.	1.11	5.71	--	1.16	0.63	15	1.47
Melanoplus femur-rubrum Deg.	4.44	37.14	4.08	24.42	--	115	11.27
Melanoplus gladstoni Scudd.	2.22	--	--	--	--	11	1.08
Melanoplus lakinus Scudd.	13.39	--	--	--	--	21	2.06
Melanoplus mexicanus Sauss.	1.11	45.71	4.08	31.39	--	133	13.03
Melanoplus occidentalis Thos.	--	--	--	3.49	1.49	25	2.45
Melanoplus packardii Scudd.	--	--	--	--	5.97	7	0.69
Melanoplus sp.	--	--	--	--	--	6	0.59
Melanoplus yarrowii Thos.	--	--	--	--	--	4	0.39
Mermiria sp.	--	--	--	--	--	3	0.29
Opeia obscura Thos.	--	--	--	1.90	--	41	4.02
Opeia testacea Scudd.	--	79.59	--	0.63	--	7	0.69
Orphulella compta Scudd.	--	--	--	--	--	12	1.18
Psoloessa delicatula Scudd.	--	--	--	2.33	--	2	0.20
Schistocerca shoshone Thos.	1.11	--	--	--	--	1	0.10
Trachyrhachis kiowa Thos.	--	--	--	1.16	8.96	10	0.98
Trinerotropis pallidipennis Burm.	1.11	--	--	1.16	11.94	11	1.08
Xanthippus cecropipes Hald.	--	2.05	--	2.33	--	6	0.59
Adults undetermined	6.67	--	--	6.98	5.70	21	2.06
Nymphs undetermined	53.33	59.43	--	5.81	56.96	511	50.08
Total specimens per environment	90	35	49	86	67	1,020	--



ARIZONA

Small grains

	<u>Percent</u>
1. <i>Melanoplus lakinus</i> -----	19
2. <i>Melanoplus femur-rubrum</i> ---	4
3. <i>Melanoplus gladstoni</i> -----	2
4. <i>Melanoplus differentialis</i> -	1
5. <i>Melanoplus mexicanus</i> -----	1
6. Four other species -----	73
Undetermined adults, 7	
Nymphs, 63	

Legumes

1. <i>Melanoplus mexicanus</i> -----	16
2. <i>Melanoplus femur-rubrum</i> ---	4
3. <i>Melanoplus occidentalis</i> ---	4
4. <i>Melanoplus bivittatus</i> -----	3
5. <i>Orphulella cernpta</i> -----	2
6. Fifteen other species -----	71
Undetermined adults, none	
Nymphs, 59	

Roadside

1. <i>Melanoplus mexicanus</i> -----	46
2. <i>Melanoplus femur-rubrum</i> ---	37
3. <i>Conozoa carinata</i> -----	9
4. <i>Melanoplus differentialis</i> -	6
5. <i>Dissosteira carolina</i> -----	2

Range

1. <i>Carmula pellucida</i> -----	10
2. <i>Melanoplus femur-rubrum</i> ---	4
3. <i>Melanoplus mexicanus</i> -----	4
4. <i>Xanthippus corallipes</i> -----	2
Nymphs, 30	

Environment not shown

1. <i>Melanoplus mexicanus</i> -----	31
2. <i>Melanoplus femur-rubrum</i> ---	24
3. <i>Conozoa carinata</i> -----	9
4. <i>Melanoplus bivittatus</i> -----	6
5. <i>Melanoplus occidentalis</i> ---	3
6. Nine other species -----	27
Undetermined adults, 2	
Nymphs, 6	

Weedy patches

	<u>Percent</u>
1. <i>Melanoplus femur-rubrum</i> ---	34
2. <i>Merniria</i> sp. -----	2
3. Four other species -----	64
Undetermined adults, 5	
Nymphs, 56	

Miscellaneous

1. <i>Trimerotropis pallidipennis</i>	12
2. <i>Trachyrhachis kiowa</i> -----	9
3. <i>Dissosteira carolina</i> L. ---	6
4. <i>Melanoplus packardii</i> -----	6
5. <i>Cord. crenulata</i> -----	3
6. Other species -----	64
Nymphs, 61	

Percentage of grand total

1. <i>Melanoplus mexicanus</i> -----	13
2. <i>Melanoplus femur-rubrum</i> ---	11
3. <i>Opeia obscura</i> -----	4
4. <i>Melanoplus occidentalis</i> ---	2
5. <i>Melanoplus lakinus</i> -----	2
6. Twenty-three other species	68
Undetermined, 2	
Nymphs, 50	

ARKANSAS

Only 537 specimens were collected in Arkansas during the adult survey. Of these M. mexicanus was most numerous, with M. differentialis second and M. femur-rubrum third. Seven counties in the northeastern part of the State constituted the only area included in the survey. In this area cotton, corn, and alfalfa were the most seriously damaged and soybeans were generally infested.

Distribution by species of 537 specimens collected in Arkansas, expressed in percentage of total number collected in each habitat

Species	Small grain	Corn	Legumes	Grassland	Environment: not shown	Total specimens	Percentage of grand total
<u>Dissosteira carolina</u> L.	0.49	--	0.46	4.90	--	7	1.19
<u>Dichromorpha viridis</u> Scudd.	0.49	--	--	--	--	1	0.17
<u>Hippiscus rugosus</u> Scudd.	--	5.41	--	--	--	2	0.34
<u>Crphulella polidna</u> Burn.	--	--	--	--	64.00	16	2.72
<u>Melanoplus differentialis</u> Thos.	21.56	32.43	20.09	9.80	--	110	18.73
<u>Melanoplus femur-rubrum</u> Deg.	10.29	2.70	24.20	20.59	4.00	97	16.52
<u>Melanoplus mexicanus</u> Sauss.	43.13	5.41	39.27	34.31	4.00	212	36.10
<u>Syrbula admirabilis</u> Uhler	--	--	--	--	23.00	7	1.19
Nymphs	24.01	21.62	15.93	25.43	--	121	20.61
Undetermined	--	32.43	--	1.96	--	14	2.38
Total specimens per environment	204	37	219	102	25	587	--

ARKANSAS

Small grains

	<u>Percent</u>
1. <i>Melanoplus mexicanus</i> -----	43
2. <i>Melanoplus differentialis</i> ----	22
3. <i>Melanoplus femur-rubrum</i> -----	10
4. <i>Dissosteira carolina</i> -----	0.49*
5. <i>Dichromorpha viridis</i> -----	0.49*
6. One other species -----	24
Undetermined adults, 0	
Nymphs, 24	

Grassland

	<u>Percent</u>
1. <i>Melanoplus mexicanus</i> -----	34
2. <i>Melanoplus femur-rubrum</i> -	21
3. <i>Melanoplus differentialis</i>	10
4. <i>Dissosteira carolina</i> -----	5
5. Two other species -----	30
Undetermined adults, 2	
Nymphs, 23	

Corn

1. <i>Melanoplus differentialis</i> ----	32
2. <i>Hippiscus rugosus</i> -----	5
3. <i>Melanoplus mexicanus</i> -----	5
4. <i>Melanoplus femur-rubrum</i> -----	3
5. Two other species -----	54
Undetermined adults, 32	
Nymphs, 22	

Environment not shown

1. <i>Orphulella pelidna</i> -----	64
2. <i>Syrbula admirabilis</i> -----	23
3. <i>Melanoplus femur-rubrum</i>	4
4. <i>Melanoplus mexicanus</i> -----	4
Undetermined adults, 0	
Nymphs, 0	

Legumes

1. <i>Melanoplus mexicanus</i> -----	39
2. <i>Melanoplus femur-rubrum</i> -----	24
3. <i>Melanoplus differentialis</i> ----	20
4. <i>Dissosteira carolina</i> -----	0.46**
5. One other species -----	16
Undetermined adults, 0	
Nymphs, 16	

Percentage of grand total

1. <i>Melanoplus mexicanus</i> ----	36
2. <i>Melanoplus differentialis</i>	19
3. <i>Melanoplus femur-rubrum</i> -	17
4. <i>Orphulella pelidna</i> -----	3
5. <i>Dissosteira carolina</i> ----	1
6. Five other species -----	24
Undetermined adults, 3	
Nymphs, 21	

\* These two species equal 1.

\*\* Taken as 1.

COLORADO

Other than *Dissosteira longipennis*, on the rangelands in the southeastern quarter of the State, *M. mexicanus* and *M. bivittatus* were the most important species. In the total collection of 13,073 specimens for the State, *D. longipennis* does not show up in its true importance. This is due to the difficulty with which adults of this species are taken by the general method for collecting practiced in the survey. Therefore the table for the important species on the range must be considered as applying to species other than *D. longipennis*. *Melanoplus bivittatus* seems to have increased in relative numbers since 1935.



Distribution by species of 18,073 specimens collected in Colorado, expressed in percentage of total number collected in each habitat

Species	Al- falfa- ture	Pas- corn	Reed- side	Range- grains	Sor- grains	Beets- beans	Small grains	Pota- toes	Total speci- mens	Percentage of grand total
Acrolophus hirtipes Say	0.03	0.04	0.06	0.06	0.06	0.06	0.06	0.06	74	0.02
Aeoloplus turnbulli Thos.	1.15	3.72	6.33	9.57	4.66	3.03	10.47	7.92	30.95	4.99
Aeropedellus clavatus Thos.	0.22	1.43	0.63	0.60	0.08	0.08	0.08	0.08	3	0.02
Ageneotettix deorum Scudd.	0.22	1.43	0.63	0.60	0.08	0.08	0.08	0.08	240	1.32
Amphitornus coloradus Thos.	0.22	1.43	0.63	0.60	0.08	0.08	0.08	0.08	115	0.63
Anabrus simplex Hald.	0.22	1.43	0.63	0.60	0.08	0.08	0.08	0.08	7	0.04
Arphia pseudonietana Thos.	0.22	1.43	0.63	0.60	0.08	0.08	0.08	0.08	3	0.02
Aulocara elliotti Thos.	0.22	1.43	0.63	0.60	0.08	0.08	0.08	0.08	407	2.24
Beopodon rubilum Say	0.05	0.76	0.31	0.75	0.03	0.17	0.17	0.17	21	0.12
Brachystola magna Gir.	0.22	1.43	0.63	0.60	0.08	0.08	0.08	0.08	50	0.33
Gammula pellucida Scudd.	0.22	1.43	0.63	0.60	0.08	0.08	0.08	0.08	12	0.07
Cherthippus longicornis Latr.	0.22	1.43	0.63	0.60	0.08	0.08	0.08	0.08	1	0.01
Cordillacris crenulata Brun.	0.22	1.43	0.63	0.60	0.08	0.08	0.08	0.08	446	2.45
Cordillacris occipitalis Thos.	0.22	1.43	0.63	0.60	0.08	0.08	0.08	0.08	55	0.30
Dactyloctenium aegyptium Thos.	0.14	1.47	0.54	1.08	1.74	2.73	2.73	2.73	6	0.03
Derotmena haydenii Thos.	0.12	0.26	0.40	0.81	0.22	1.20	0.95	0.23	122	1.00
Dissosteira carolina L.	0.12	0.26	0.40	0.81	0.22	1.20	0.95	0.23	67	0.37
Dissosteira longipennis Thos.	0.30	19.56	1.03	0.21	3.85	0.17	0.17	0.17	1,114	6.13
Drepanopterna fenestratum Scudd.	0.02	0.36	0.13	0.15	2.53	0.17	0.17	0.17	112	0.62
Ereopterolophus sordidus	0.05	0.07	0.07	0.08	0.08	0.08	0.08	0.08	21	0.12
costalis Scudd.	0.05	0.07	0.07	0.08	0.08	0.08	0.08	0.08	53	0.29
Hedrotettix trifasciatus Say	0.02	0.52	0.04	0.15	0.73	0.34	0.34	0.34	128	0.70
Hesperotettix speciosus Scudd.	0.02	0.52	0.04	0.15	0.73	0.34	0.34	0.34	57	0.31
Hesperotettix viridis Thos.	0.02	1.24	0.13	0.23	0.03	0.03	0.03	0.03	2	0.01
Hippiscus rugosus Scudd.	0.02	1.24	0.13	0.23	0.03	0.03	0.03	0.03	1	0.01
Hypochochloa alba Dodge	0.02	1.24	0.13	0.23	0.03	0.03	0.03	0.03	735	4.32
Melanoplus angustipennis Dodge	1.99	6.42	3.95	5.34	5.25	4.79	3.33	2.52	4	0.02
Melanoplus arizonae Scudd.	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	2,077	11.42
Melanoplus bivittatus Say	24.91	4.60	15.85	8.16	0.28	11.79	14.76	25.91	442	2.43
Melanoplus bowditchi Scudd.	0.02	8.51	0.40	1.29	3.60	0.03	0.03	0.03	1	0.01
Melanoplus confusus Scudd.	0.02	8.51	0.40	1.29	3.60	0.03	0.03	0.03	818	4.50
Melanoplus differentialis Thos.	8.21	1.34	6.60	3.93	0.08	5.13	15.71	14.90	4.17	14.29

Distribution by species of 18,076 specimens collected in Colorado, expressed in percentage of total number collected in each habitat--Continued

Species	Al- fal- ture	Pas- ture	Corn	Road- side	Range	Sum- mers	Beets	Beans	Grains	Pota- toes	Total	Percentage of speci- mens
Melanoplus femur-rubrun Deg.	19.53	3.19	2.65	7.11	0.06	2.39	14.23	16.05	20.21	4.76	1,425	7.34
Melanoplus flavidus Scudd.	0.34	1.99	2.07	3.42	1.04	0.55	--	0.46	0.42	--	231	1.55
Melanoplus foedus Scudd.	2.38	8.80	19.31	13.63	4.55	15.04	0.95	8.94	6.25	9.52	1,745	9.60
Melanoplus gladstoni Scudd.	0.05	0.23	0.36	0.13	0.42	--	--	--	--	--	38	0.21
Melanoplus infantilis Scudd.	--	0.10	--	--	0.48	--	--	--	--	--	20	0.11
Melanoplus keeleri luridus Dodge	--	--	--	--	0.06	--	--	--	--	--	2	0.01
Melanoplus lakinus Scudd.	2.71	2.80	7.23	4.77	1.74	11.79	10.47	15.59	10.62	11.90	1,046	5.75
Melanoplus mexicanus Sauss.	7.61	7.56	20.25	13.80	4.66	25.98	3.33	13.53	13.33	9.52	1,936	10.65
Melanoplus occidentalis Thos.	0.07	1.66	0.27	0.93	2.31	--	--	--	--	--	191	1.05
Melanoplus packardii Scudd.	1.03	5.33	4.80	5.61	2.95	3.93	0.95	0.69	4.17	--	623	3.43
Melanoplus regalis Dodge	--	0.03	--	--	0.14	--	--	--	--	--	6	0.03
Mermiria maculipennis Brun.	0.05	3.00	0.49	0.43	0.62	0.51	--	--	1.25	--	152	0.84
Mormiria mexicana Thos.	--	0.13	--	--	--	--	--	--	--	--	4	0.02
Metator pardalinus Sauss.	0.05	0.46	0.04	0.33	2.61	0.17	--	--	--	--	122	0.67
Opeia obscura Thos.	--	0.33	0.04	--	1.21	--	--	--	--	--	54	0.30
Orphulella pelidna Brun.	--	0.10	--	--	--	--	--	--	--	--	3	0.02
Pardalophora haldemani Scudd.	--	--	0.04	--	--	--	--	--	--	--	1	0.01
Paropomala wyomingensis Thos.	--	1.73	0.04	0.06	0.34	--	--	--	--	--	68	0.37
Philibostroma quadrimaculatum Thos.	--	0.98	0.40	0.15	7.67	--	--	--	--	--	317	1.74
Phoetaliotes nebrascensis Thos.	--	1.47	0.36	0.15	0.11	0.34	--	--	--	--	64	0.35
Psoloessa delicatula delicatula Scudd.	--	--	--	--	0.06	--	--	--	--	--	2	0.01
Spharagenon collaris Scudd.	0.86	1.86	1.08	0.66	1.41	1.20	--	0.69	0.42	--	201	1.11
Spharagenon equale Say	--	1.37	0.13	0.36	0.22	1.03	--	0.23	--	--	72	0.40
Trachyrhachis kiowa Thos.	0.02	0.49	0.04	0.06	3.26	--	--	--	0.21	--	136	0.75
Trimerotropis agrestis McNeill	--	0.03	--	0.06	--	--	--	--	--	--	3	0.02
Trimerotropis laticincta Sauss.	--	0.85	0.53	0.60	5.40	0.35	--	0.23	0.21	--	253	1.42
Trimerotropis pallidipennis Brun.	0.02	0.05	--	0.45	--	0.34	--	--	--	--	19	0.10
Tropidolophus formosus Say	--	--	--	--	0.08	--	--	--	--	--	3	0.02
Nymphs	13.49	0.52	1.43	6.37	5.76	0.51	24.76	--	7.08	--	1,134	6.24
Total specimens per environment	4,164	3,065	2,226	3,323	3,547	585	210	436	480	42	18,076	--

COLORADO

Alfalfa

	<u>Percent</u>
1. <i>Melanoplus bivittatus</i> -----	25
2. <i>Melanoplus femur-rubrum</i> -----	20
3. <i>Melanoplus lakinus</i> -----	9
4. <i>Dissosteira longipennis</i> -----	8
5. <i>Melanoplus differentialis</i> -----	8
6. Twenty-four other species -----	30
Nymphs, 13.49	

Sorghums

	<u>Percent</u>
1. <i>Melanoplus mexicanus</i> -----	26
2. <i>Melanoplus foedus</i> -----	15
3. <i>Melanoplus bivittatus</i> -----	12
4. <i>Melanoplus lakinus</i> -----	12
5. <i>Aeoloplus turnbulli</i> -----	8
6. Nineteen other species -----	27
Nymphs, 0.51	

Pasture

1. <i>Dissosteira longipennis</i> -----	20
2. <i>Melanoplus foedus</i> -----	9
3. <i>Melanoplus bowditchi</i> -----	9
4. <i>Melanoplus mexicanus</i> -----	8
5. <i>Melanoplus angustipennis</i> -----	6
6. Forty-six other species -----	43
Nymphs, 0.52	

Beets

1. <i>Melanoplus differentialis</i> -----	16
2. <i>Melanoplus bivittatus</i> -----	15
3. <i>Melanoplus femur-rubrum</i> -----	14
4. <i>Aeoloplus turnbulli</i> -----	10
5. <i>Melanoplus lakinus</i> -----	10
6. Five other species -----	35
Nymphs, 24.76	

Corn

1. <i>Melanoplus mexicanus</i> -----	20
2. <i>Melanoplus foedus</i> -----	19
3. <i>Melanoplus bivittatus</i> -----	16
4. <i>Melanoplus lakinus</i> -----	7
5. <i>Aeoloplus turnbulli</i> -----	6
6. Thirty-six other species -----	32
Nymphs, 1.48	

Beans

1. <i>Melanoplus bivittatus</i> -----	26
2. <i>Melanoplus femur-rubrum</i> -----	16
3. <i>Melanoplus lakinus</i> -----	16
4. <i>Melanoplus differentialis</i> -----	15
5. <i>Melanoplus mexicanus</i> -----	14
6. Eight other species -----	13
Nymphs, 0	

Roadside

1. <i>Melanoplus foedus</i> -----	19
2. <i>Melanoplus mexicanus</i> -----	14
3. <i>Aeoloplus turnbulli</i> -----	10
4. <i>Melanoplus bivittatus</i> -----	8
5. <i>Melanoplus femur-rubrum</i> -----	7
6. Twenty-nine other species -----	42
Nymphs, 6.87	

Small grains

1. <i>Melanoplus femur-rubrum</i> -----	20
2. <i>Melanoplus mexicanus</i> -----	18
3. <i>Melanoplus lakinus</i> -----	11
4. <i>Melanoplus bivittatus</i> -----	9
5. <i>Aeoloplus turnbulli</i> -----	8
6. Nineteen other species -----	34
Nymphs, 7.08	

Range\*

1. <i>Cordillacris crenulata</i> -----	12
2. <i>Aulocara ellioti</i> -----	8
3. <i>Phlibostroma quadrimaculatum</i> -----	8
4. <i>Trimerotropis laticincta</i> -----	5
5. <i>Melanoplus angustipennis</i> -----	5
6. Forty-four other species -----	62
Nymphs, 5.76	

Potatoes

1. <i>Aeoloplus turnbulli</i> -----	31
2. <i>Melanoplus bivittatus</i> -----	14
3. <i>Melanoplus differentialis</i> -----	14
4. <i>Melanoplus lakinus</i> -----	12
5. <i>Melanoplus mexicanus</i> -----	10
6. Three other species -----	19
Nymphs, 0	

\*Other than *Dissosteira longipennis*



COLORADO Continued

Percentage of grand total

1. <i>Melanoplus bivittatus</i> -----	11
2. <i>Melanoplus mexicanus</i> -----	11
3. <i>Melanoplus foedus</i> -----	10
4. <i>Melanoplus femur-rubrum</i> -----	8
5. <i>Dissosteira longipennis</i> -----	6
6. Fifty-four other species -----	54
Nymphs, 6.24	

ICWA

In Iowa 14,607 specimens were collected. The most important species from the standpoint of relative numbers was *M. femur-rubrum*, with *M. mexicanus* second, *M. differentialis* third, and *M. bivittatus* fourth. A great number of nymphs made up the collections and these were not determined. Most of them were probably the second generation of *M. mexicanus*.

From infestations limited to 27 counties in the western third of the State in 1935, populations built up to outbreak numbers in all counties of the State in 1937. Heavy rains in the spring of 1933 delayed hatching and it is probable that the populations have been reduced, although this has not been determined with any degree of accuracy.

The preponderant species in this State were *M. differentialis* in the southern and southwestern parts; *M. mexicanus* and *M. bivittatus* in the western and northwestern parts; and *M. femur-rubrum* in the northern, east-central, and northeastern parts.

Distribution by species of 14,607 specimens collected in Iowa, expressed in percentage of total number collected in each habitat

Species	Leg- umes	Road- side	Field :ture	Small grains	River :bct- :tom	Weeds :Range	Environ- ment not : given	Corn : row	Fence : mens	Total : Number	Percent- age of : grand total
Acrolophus hirtipes Say	---	---	0.02	---	---	---	---	---	---	1	0.01
Aeoloplus turnbullii bruneri Caud.	---	---	0.32	---	---	---	---	---	---	13	0.09
Aeropedellus clavatus Thos.	---	---	---	---	---	4.06	---	---	---	19	0.13
Ageneotettix deorum Scudd.	1.44	1.31	3.78	1.55	---	0.83	13.46	5.77	1.45	345	2.36
Arphia pseudonietana Thos.	---	---	0.02	---	---	---	0.64	---	---	4	0.03
Aulocara elliotti Thos.	---	---	0.30	0.13	---	---	2.14	---	---	44	0.30
Chorthippus longicornis Latr.	---	---	0.02	---	2.58	---	---	---	---	15	0.10
Cordillacris occipitalis Thos.	---	---	---	---	---	3.84	---	---	---	18	0.12
Darotmema haydeni Thos.	0.02	---	---	---	---	---	---	---	---	1	0.01
Dichromorpha viridis Scudd.	---	0.06	0.05	---	---	---	---	---	---	3	0.02
Dissosteira carolina L.	0.18	1.42	0.50	0.13	0.37	---	---	---	0.29	59	0.40
Encyrtolophus sordidus costalis Scudd.	---	0.23	---	---	---	---	---	---	---	4	0.03
Encyrtolophus sordidus sordidus Burm.	0.06	0.23	0.12	0.07	---	---	0.64	---	---	16	0.11
Eurotettix trifasciatus Say	---	---	0.05	---	---	---	---	---	---	2	0.01
Fesperotettix viridis Thos.	---	---	0.10	---	---	---	0.21	---	---	5	0.03
Hippiscus rugosus Scudd.	---	0.06	0.32	---	0.19	---	0.43	1.92	0.29	19	0.13
Melanoplus bivittatus Say	4.69	12.06	0.67	3.43	2.95	2.75	---	3.85	20.29	626	4.28
Melanoplus confusus Scudd.	---	---	0.05	---	---	---	1.28	---	---	8	0.05
Melanoplus differentialis Thos.	4.16	7.45	2.04	2.83	10.66	1.33	1.71	30.77	37.57	684	4.68
Melanoplus femur-rubrum Deg.	3.86	52.35	40.54	36.01	46.39	---	3.84	25.08	10.72	5,121	35.03
Melanoplus gladstoni Scudd.	0.28	---	---	0.07	---	---	0.21	---	---	16	0.11
Melanoplus keeleri luridus Dodge	0.02	---	0.02	---	---	---	2.35	---	---	13	0.09
Melanoplus mexicanus Sauss.	13.38	10.30	17.16	10.30	3.68	3.03	7.05	5.77	7.52	1,802	12.33
Melanoplus occidentalis Thos.	---	0.46	0.15	0.07	---	0.83	9.18	---	---	55	0.44
Melanoplus packardii Scudd.	0.24	0.06	---	---	---	0.55	---	---	---	28	0.19
Mestobregma plattei Thos.	---	0.06	---	---	---	---	---	---	---	1	0.01
Orpulella pelidna Burm.	0.08	0.60	3.09	0.30	---	---	0.55	---	0.29	147	1.01
Orpulella speciosa Scudd.	---	---	0.37	0.07	---	---	4.91	---	---	39	0.27
Photoliotus nebrascensis Thos.	---	0.17	0.10	0.40	---	---	5.84	---	---	45	0.31
Schistocerca lineata Scudd.	0.02	---	---	---	---	---	---	---	---	1	0.01
Spharagemon collaris Scudd.	0.02	---	---	---	---	---	---	---	---	1	0.01
Spharagemon equale Say	0.02	---	---	0.07	---	---	---	---	---	2	0.01
Syrbula admirabilis Unl.	---	---	0.07	---	---	---	---	---	---	3	0.02
Trachyrhachis kiowa Thos.	0.18	---	0.07	---	---	---	0.21	---	---	13	0.09
Nymphs	41.04	13.14	29.93	44.49	32.95	90.61	35.10	28.85	21.16	5,424	37.10
Total specimens per environment	5,059	1,755	4,012	1,484	543	363	468	52	345	14,607	---

ICWA

Legumes

	<u>Percent</u>
1. Melanoplus femur-rubrum -----	34
2. Melanoplus mexicanus -----	13
3. Melanoplus bivittatus -----	5
4. Melanoplus differentialis -----	4
5. Ageneotettix deorum -----	1
6. Eleven other species -----	43
Nymphs, 41.04	

Roadside

1. Melanoplus femur-rubrum -----	52
2. Melanoplus bivittatus -----	12
3. Melanoplus mexicanus -----	10
4. Melanoplus differentialis -----	7
5. Dissosteira carolina -----	1
6. Nine other species -----	18
Nymphs, 13.14	

Pasture

1. Melanoplus femur-rubrum -----	41
2. Melanoplus mexicanus -----	17
3. Ageneotettix deorum -----	4
4. Orphulella pelidna -----	3
5. Melanoplus differentialis -----	2
6. Nineteen other species -----	33
Nymphs, 29.93	

Small grains

1. Melanoplus femur-rubrum -----	36
2. Melanoplus mexicanus -----	10
3. Melanoplus bivittatus -----	3
4. Melanoplus differentialis -----	3
5. Ageneotettix deorum -----	2
6. Nine other species -----	46
Nymphs, 44.49	

River bottom

1. Melanoplus femur-rubrum -----	46
2. Melanoplus differentialis -----	11
3. Melanoplus mexicanus -----	4
4. Melanoplus bivittatus -----	3
5. Chorthippus longicornis -----	3
6. Two other species -----	33
Nymphs, 32.95	

Weeds

	<u>Percent</u>
1. Melanoplus mexicanus -----	3
2. Melanoplus bivittatus -----	3
3. Melanoplus differentialis -----	1
4. Ageneotettix deorum -----	1
5. Melanoplus occidentalis -----	1
6. One other species -----	91
Nymphs, 90.61	

Range

1. Ageneotettix deorum -----	13
2. Melanoplus occidentalis -----	9
3. Melanoplus mexicanus -----	7
4. Phoetaliotes nebrascensis -----	7
5. Orphulella speciosa -----	5
6. Fourteen other species -----	59
Nymphs, 36.10	

Environment not given

1. Aulocara ellioti -----	4
2. Melanoplus occidentalis -----	3
3. Melanoplus mexicanus -----	1
4. Other species -----	92
Nymphs, 91.63	

Corn

1. Melanoplus differentialis -----	31
2. Melanoplus femur-rubrum -----	23
3. Ageneotettix deorum -----	6
4. Melanoplus mexicanus -----	6
5. Melanoplus bivittatus -----	4
6. One other species -----	30
Nymphs, 28.85	

Fence row

1. Melanoplus differentialis -----	38
2. Melanoplus bivittatus -----	20
3. Melanoplus femur-rubrum -----	11
4. Melanoplus mexicanus -----	8
5. Ageneotettix deorum -----	1
6. Three other species -----	22
Nymphs, 21.16	



Percentage of grand total

1.	Melanoplus femur-rubrum -----	35
2.	Melanoplus mexicanus -----	12
3.	Melanoplus differentialis ----	5
4.	Melanoplus bivittatus -----	4
5.	Ageneotettix decorum -----	2
6.	Twenty-nine other species ---	42
	Nymphs, 37	

KANSAS

Of the 9,492 specimens taken in Kansas, Melanoplus mexicanus was dominant with M. differentialis second in importance. The most severe infestations occurred in the north-central part of the State. There was a second generation of M. mexicanus. Egg deposition by this generation began about September 20 and continued until late in November.

Distribution by species, of 9,492 specimens collected in Kansas, expressed in percentage of total number collected

Distribution by species, of 9,422 specimens collected in Kansas, expressed in percentage of total number collected in each habitat

Species	Small : grains	Legs : tines	Pass : ture	Wet : es	Wet : es	Wind : rows	Road : side	Bot : tom	Creek : Environ	Range : Grass	Land : mens	Total : speci	Percent : age of
<i>Acrolophus turnbulli</i> Thos.	1.67	0.09	0.90	4.53	3.23	3.77	0.33	0.97	1.91	---	---	142	1.49
<i>Acrolophus hirtipes</i> Say	---	---	0.14	---	---	---	---	---	---	---	---	2	0.02
<i>Agrostotettix deorum</i> Scudd.	0.67	1.42	3.60	0.09	---	0.44	0.66	11.44	3.23	14.36	---	343	3.60
<i>Amphitornus coloratus</i> Thos.	---	---	---	---	---	---	---	---	---	0.19	---	1	0.01
<i>Aulocara elliptici</i> Thos.	1.74	0.09	1.60	0.19	---	0.44	0.33	2.27	12.13	0.39	---	173	1.82
<i>Beopelion nubilum</i> Say	---	---	0.14	---	---	0.44	0.66	---	---	2.14	---	16	0.17
<i>Beopelion maculatum</i> Caud.	0.06	---	0.07	0.61	---	---	---	---	---	---	---	3	0.03
<i>Cordilleris occipitalis</i> Thos.	---	---	---	---	---	---	---	---	0.73	---	---	5	0.05
<i>Cordilleris crenulata</i> Brun.	---	---	0.07	---	---	---	---	0.41	59.75	---	---	413	4.34
<i>Derotrema haydenii</i> Thos.	---	---	---	---	---	0.44	---	---	0.29	---	---	3	0.03
<i>Dissosteira carolina</i> L.	0.50	0.09	---	---	3.23	2.19	---	---	---	---	---	16	0.17
<i>Dissosteira longipennis</i> Thos.	0.06	0.09	---	---	19.67	3.51	---	0.08	0.44	---	---	26	0.27
<i>Drepanopterna femoratum</i> Scudd.	0.06	---	---	---	---	---	---	---	3.33	---	---	24	0.25
<i>Encoptolophus sordidus</i> costalis Scudd.	0.12	---	---	---	---	---	---	---	---	---	---	2	0.02
<i>Hadrotettix trifasciatus</i> Say	---	0.14	0.14	---	---	---	---	---	0.88	---	---	11	0.12
<i>Hesperotettix speciosus</i> Scudd.	---	---	---	12.77	---	---	2.64	---	---	0.52	---	147	1.54
<i>Hesperotettix viridis</i> Thos.	---	0.14	1.22	---	---	---	---	---	---	---	---	4	0.04
<i>Hippiscus rugosus</i> Scudd.	0.06	---	0.42	---	---	---	---	---	---	0.97	---	12	0.13
<i>Hypochoera alba</i> Dodge	---	---	---	---	---	---	---	---	---	0.19	---	1	0.01
<i>Melanoplus angustipennis</i> Dodge	---	0.14	---	0.61	---	---	0.66	---	---	---	---	6	0.06
<i>Melanoplus bivittatus</i> Say	1.12	5.99	1.31	6.71	---	0.38	26.40	5.51	---	0.19	---	330	3.47
<i>Melanoplus bispinosus</i> Scudd.	---	0.37	---	---	---	---	---	0.24	---	---	---	11	0.12
<i>Melanoplus confusus</i> Scudd.	---	0.09	0.23	---	---	---	0.33	0.16	---	---	---	9	0.09
<i>Melanoplus differentialis</i> Thos.	4.03	8.77	0.21	14.62	---	0.44	10.56	8.11	---	---	---	416	4.37
<i>Melanoplus flavidus</i> Scudd.	---	0.23	---	---	---	---	---	---	---	---	---	5	0.05
<i>Melanoplus foedus fluvialis</i> Brun.	0.06	0.55	---	0.61	---	---	---	---	---	---	---	14	0.15
<i>Melanoplus femur-rubrum</i> Deg.	0.81	0.96	0.07	7.32	---	---	1.98	0.49	---	3.30	---	76	0.80
<i>Melanoplus foedus foedus</i> Scudd.	---	0.09	---	---	0.88	---	---	---	0.15	---	---	5	0.05
<i>Melanoplus infantilis</i> Scudd.	---	---	---	---	---	---	---	0.08	---	---	---	1	0.01
<i>Melanoplus imiger</i> Scudd.	---	0.76	---	---	---	---	---	0.16	---	---	---	19	0.20

Distribution by species, of 9,492 specimens collected in Kansas, expressed in percentage of total number collected in each habitat--Continued

Species	Small : grains	Leg-umes	Pas-: ture	Corn	patch-: es	Weedy	Wind-: rows	Road-: side	Creek: bot-: tom	Environ-: shown	Range: Grass-: land	Grass-: mens	Percent-: age of
												Number:	grand total
Melanoplus mexicanus Sauss.	31.25	10.74	7.68	55.43	8.64	1.64	15.35	14.85	5.84	1.61	8.15	1,239	13.01
Melanoplus occidentalis Thos.	0.06	--	--	--	0.09	--	--	--	--	5.14	--	37	0.39
Melanoplus packardii Scudd.	2.73	2.06	2.07	2.44	0.09	--	6.14	3.63	1.78	0.44	2.14	184	1.93
Melanoplus lakinus Scudd.	1.92	0.64	0.07	1.22	0.19	--	3.95	1.32	1.30	--	0.97	84	0.88
Melanoplus regalis Dodge	0.06	--	0.14	--	0.19	--	--	0.99	0.49	0.29	0.19	17	0.18
Mermiria maculipennis Brun.	0.06	--	1.31	1.22	--	--	--	3.96	0.16	0.15	1.55	45	0.47
Mermiria neomexicana Thos.	--	--	0.55	--	--	--	--	--	--	--	0.53	11	0.12
Metator pardalinus Sauss.	--	--	--	--	--	--	--	--	--	0.29	--	2	0.02
Nymphs	51.96	65.49	75.43	4.27	72.87	--	49.99	29.04	36.50	1.03	--	4,803	50.43
Opeia obscura Thos.	--	--	0.07	--	--	--	--	--	3.73	--	37.85	242	2.54
Orphulella speciosa Scudd.	--	--	2.08	--	--	--	--	--	0.32	--	0.08	38	0.40
Orphulella pelidna Burn.	--	0.14	--	--	--	--	--	--	--	--	13.98	75	0.79
Paradallophora sp.	--	0.05	--	--	--	--	--	--	--	--	--	1	0.01
Phlibostroma quadrimacul- atum Thos.	0.12	0.41	0.35	--	--	--	--	1.65	15.90	3.08	3.69	257	2.70
Phoetaliotes nebrascensis Thos.	--	--	0.14	1.22	--	--	--	--	--	--	0.58	7	0.07
Schistocerca lineata Scudd.	0.06	--	--	--	--	--	--	--	--	--	--	1	0.01
Spharagemon collare Scudd.	0.12	0.09	--	--	--	6.56	3.95	--	0.08	--	--	18	0.19
Spharagemon equale Say	0.25	0.32	0.07	--	--	--	0.88	--	--	0.29	--	16	0.17
Syrbula admirabilis Uhl.	--	--	0.42	--	--	--	--	--	0.08	--	6.21	39	0.41
Trimerotropis laticincta Sauss.	--	--	--	--	--	54.10	--	--	--	0.29	--	35	0.37
Trachyrhachis kiowa Thos.	0.12	0.09	0.35	--	--	11.48	1.32	--	3.89	4.40	0.97	102	1.07
Undetermined	0.06	0.09	--	--	--	--	--	--	--	--	--	3	0.03
Total specimens per environment	1,612	2,186	1,444	164	1,065	61	228	303	1,233	681	515	9,492	--



KANSAS

Small grains

	<u>Percent</u>
1. <i>Melanoplus mexicanus</i> -----	31
2. <i>Melanoplus differentialis</i> --	4
3. <i>Melanoplus packardii</i> -----	3
4. <i>Melanoplus lakinus</i> -----	2
5. <i>Aulocara ellioti</i> -----	2
6. Twenty-one other species ---	58
Nymphs, 51.96	
Undetermined adults, 0.06	

Legumes

1. <i>Melanoplus mexicanus</i> -----	11
2. <i>Melanoplus differentialis</i> --	9
3. <i>Melanoplus bivittatus</i> -----	6
4. <i>Melanoplus packardii</i> -----	2
5. <i>Ageneotettix deorum</i> -----	1
6. Twenty-five other species --	71
Nymphs, 65.49	
Undetermined adults, 0.09	

Pasture

1. <i>Melanoplus mexicanus</i> -----	8
2. <i>Ageneotettix deorum</i> -----	4
3. <i>Orphulella speciosa</i> -----	2
4. <i>Melanoplus packardii</i> -----	2
5. <i>Aulocara ellioti</i> -----	2
6. Twenty-three other species -	82
Nymphs, 75.43	

Corn

1. <i>Melanoplus mexicanus</i> -----	55
2. <i>Melanoplus differentialis</i> --	14
3. <i>Melanoplus femur-rubrum</i> ----	7
4. <i>Melanoplus bivittatus</i> -----	7
5. <i>Ageneotettix deorum</i> -----	3
6. Nine other species -----	14
Nymphs, 4.27	

Weedy patches

1. <i>Hesperotettix speciosus</i> -----	13
2. <i>Melanoplus mexicanus</i> -----	9
3. <i>Aeoloplus turnbulli</i> -----	5
4. <i>Aulocara ellioti</i> -----	0.19*
5. <i>Melanoplus lakinus</i> -----	0.19*
6. Five other species -----	72
Nymphs, 72.87	

Windrows

	<u>Percent</u>
1. <i>Trimerotropis laticincta</i> ---	54
2. <i>Derotnema longipennis</i> -----	20
3. <i>Trachyrhachis kiowa</i> -----	11
4. <i>Spharagemon collare</i> -----	7
5. <i>Aeoloplus turnbulli</i> -----	3
6. Two other species -----	5
Nymphs, none	

Roadside

1. <i>Melanoplus mexicanus</i> -----	15
2. <i>Aeoloplus turnbulli</i> -----	9
3. <i>Melanoplus packardii</i> -----	6
4. <i>Melanoplus lakinus</i> -----	4
5. <i>Spharagemon collare</i> -----	4
6. Twelve other species -----	62
Nymphs, 49.99	

Creek bottom

1. <i>Melanoplus bivittatus</i> -----	26
2. <i>Melanoplus mexicanus</i> -----	15
3. <i>Melanoplus differentialis</i> --	11
4. <i>Mermiria maculipennis</i> -----	4
5. <i>Melanoplus packardii</i> -----	4
6. Twelve other species -----	40
Nymphs, 29.04	

Environment not shown

1. <i>Philibostroma quadrimaculatum</i>	16
2. <i>Ageneotettix deorum</i> -----	11
3. <i>Melanoplus differentialis</i> --	8
4. <i>Melanoplus mexicanus</i> -----	6
5. <i>Melanoplus bivittatus</i> -----	6
6. Nineteen other species -----	53
Nymphs, 36.50	

Range

1. <i>Cordillacris crenulata</i> -----	60
2. <i>Aulocara ellioti</i> -----	12
3. <i>Melanoplus occidentalis</i> -----	5
4. <i>Trachyrhachis kiowa</i> -----	4
5. <i>Drepanopterna femoratum</i> ----	3
6. Sixteen other species -----	16
Nymphs, 1.03	

\*These two species equal 1.

KANSAS--Continued

Grassland

	<u>Percent</u>
1. Opeia obscura -----	33
2. Ageneotettix deorum -----	14
3. Orphulella pelidna -----	14
4. Melanoplus mexicanus -----	8
5. Syrbula admirabilis -----	6
6. Seventeen other species -----	20
Nymphs, none	

Percentage of grand total

1. Melanoplus mexicanus -----	13
2. Melanoplus differentialis -----	4
3. Cordillacris crenulata -----	4
4. Ageneotettix deorum -----	4
5. Melanoplus bivittatus -----	3
6. Forty-seven other species -----	72
Nymphs, 50.43	

MICHIGAN

The most severe infestations were limited to the northern half of the Lower Peninsula. There were 2,582 specimens collected, most of which were Melanoplus mexicanus. Cannula pellucida was second in numbers and M. femur-rubrum third.

Distribution by species of 2,582 specimens collected in Michigan, expressed in percentage of total number collected in each habitat

Species	:Small:	:grains:	:Inland:	:Corn:	:Leg-umes:	:Pas-:ture:	:Environ-ment:	:Total:	:Percent-
									age of
									grand total
Ageneotettix deorum Scudd.	--	--	--	--	--	1.58:	2.78	50:	1.94
Arphia pseudonietana Thos.	--	--	4.17:	--	--	1.01:	1.44	30:	1.16
Cammula pellucida Scudd.	--	--	29.17:	--	9.43:	17.25:	7.67	354:	13.70
Chorthippus longicornis Iatr.	--	--	--	--	1.89:	--	--	1:	.04
Dissoptera carolina L.	--	--	--	--	--	--	.1	1:	.04
Encoptolophus sordidus costalis Scudd.	--	--	4.17:	--	--	--	.44	5:	.19
Encoptolophus sordidus sordidus Burn.	--	--	--	--	--	.13:	--	2:	.08
Melanoplus angustipennis Dodge	--	--	--	--	--	--	1.00	9:	.35
Melanoplus bivittatus Say	--	--	--	--	--	.13:	.33	5:	.19
Melanoplus dawsoni Scudd.	--	--	--	--	--	.13:	--	2:	.08
Melanoplus femur-rubrum Deg.	--	--	--	--	15.09:	3.03:	4.89	100:	3.87
Melanoplus infantilis Scudd.	--	--	--	--	--	.19:	--	3:	.12
Melanoplus keeleri luridus Dodge	--	--	--	--	--	.13:	--	2:	.08
Melanoplus mexicanus Saus.	100.0:	54.17:	100.0:	73.58:	76.09:	80.10	--	1,999:	77.36
Orphulella speciosa Scudd.	--	--	--	--	--	.13:	--	2:	.08
Schistocerca alutacea Harr.	--	--	--	--	--	--	.44	4:	.15
Spharagomon collare Scudd.	--	--	--	--	--	.19:	.89	11:	.43
Nymphs	--	--	8.33:	--	--	--	--	2:	.08
Total specimens per environment	8	24	15	53	1,582	900	--	2,582:	--

MICHIGAN

<u>Small grains</u>		<u>Pasture</u>	
	<u>Percent</u>		<u>Percent</u>
1. <i>Melanoplus mexicanus</i> -----	100	1. <i>Melanoplus mexicanus</i> -----	76
Nymphs, 0		2. <i>Camnula pellucida</i> -----	17
		3. <i>Melanoplus femur-rubrum</i> ----	3
		4. <i>Ageneotettix deorum</i> -----	2
		5. <i>Arphia pseudonietana</i> -----	1
		6. Seven other species -----	1
		Nymphs, 0	
<u>Inland</u>		<u>Environment not shown</u>	
1. <i>Melanoplus mexicanus</i> -----	54	1. <i>Melanoplus mexicanus</i> -----	80
2. <i>Camnula pellucida</i> -----	29	2. <i>Camnula pellucida</i> -----	8
3. <i>Arphia pseudonietana</i> -----	4	3. <i>Melanoplus femur-rubrum</i> ----	5
4. <i>Encoptolophus sordidus</i>		4. <i>Ageneotettix deorum</i> -----	3
costalis -----	4	5. <i>Arphia pseudonietana</i> -----	1
5. One other species -----	9	6. Six other species -----	3
Nymphs, 8.33		Nymphs, 0	
<u>Corn</u>			
1. <i>Melanoplus mexicanus</i> -----	100		
Nymphs, 0			
<u>Legumes</u>			
1. <i>Melanoplus mexicanus</i> -----	74		
2. <i>Melanoplus femur-rubrum</i> ----	15		
3. <i>Camnula pellucida</i> -----	9		
4. <i>Chorthippus longicornis</i>			
Latr. -----	2		
Nymphs, 0			
<u>Percentage of grand total</u>			
1. <i>Melanoplus mexicanus</i> -----	77		
2. <i>Camnula pellucida</i> -----	14		
3. <i>Melanoplus femur-rubrum</i> ----	4		
4. <i>Ageneotettix deorum</i> -----	2		
5. <i>Arphia pseudonietana</i> -----	1		
6. Thirteen other species -----	2		
Nymphs, 0.03			

MINNESOTA

Infestations increased in the southern half of the State during 1937. There were 10,583 specimens collected in the State, of which *Camnula pellucida* was the most numerous, *Melanoplus mexicanus* second, *M. femur-rubrum* third, and *M. bivittatus* fourth. *M. mexicanus* went from fourth place in 1935 to second place in 1937, making this exchange with *M. bivittatus*.



Distribution by species of 10,853 specimens collected in Minnesota, expressed in percentage of total number collected in each habitat

Species	Small : grains	Legumes	Meadow	Pastures	Roadside	Idle land	Environment	Total	Percent of age of ground total
Aeropedellus clavatus Thos.	5.24	4.36	9.32	4.51	1.62	3.68	6.32	605	5.57
Ageneotettix deorum Scudd.	.09	.05	.88	.25	.06	.15	.57	36	3.33
Arphia pseudonietana Thos.		.22	.35		.87			31	2.89
Aulocara ellicotti Thos.	20.70	16.41	14.79	5.12	29.53	37.41	32.76	2,342	21.55
Camula pellucida Scudd.	.86	.63	1.73	3.45	.50	4.29		151	1.39
Chioneltis conspersa Harr.	3.20	1.72	.85	1.28	15.34	1.83	10.02	432	3.97
Chorthippus longicornis Latr.	2.56	3.43	10.77	11.34	5.67	2.61	9.77	695	6.39
Dissoctelphus sordidus costalis Scudd.			.03					1	.01
Eritettix simplex tricarinatus Thos.			.06					2	.02
Hesperotettix viridis Thos.	4.52	.92	2.17	.12	.75	3.07		221	2.03
Melanoplus angustipennis Dodge	13.56	10.58	5.28	10.36	15.38	3.13	19.13	1,161	10.68
Melanoplus bivittatus Say		.05	.03		.19	.31		7	.06
Melanoplus bruneri Scudd.		.05	.03					2	.02
Melanoplus confusus Scudd.	5.38	4.63	7.91	8.63	6.04	9.50	7.57	711	6.54
Melanoplus dawsoni Scudd.	20.24	22.99	8.35	9.25	8.47	7.02	30.86	1,592	14.70
Melanoplus femur-rubrum DeG.	.25	2.42	3.01	3.03	.31	1.23		205	1.89
Melanoplus gladstoni Scudd.	.09	.73	2.73	3.62	.12		.57	112	1.03
Melanoplus infantilis Scudd.	.09	.33	.03		.12	.15		14	.13
Melanoplus keeleri luridus Dodge	15.50	15.04	22.67	7.54	8.53	10.27	37.03	1,761	16.20
Melanoplus mexicanus Sauss.	2.71	2.47	1.10	.37	2.87	1.36	1.65	1,213	1.96
Melanoplus packardii Scudd.	.09	.10	.22				.57	12	.11
Metator pardalinus Sauss.		.15						3	.03
Opeia obscura Thos.	.53	.32	.50		.12	.15		40	.37
Orphulella pelidna Burr.	.27	.10	.91	.12	.37	.13		47	.43
Orphulella speciosa Scudd.	.27	.68	1.79	.12	.19		1.15	83	.76
Phoetaliotes nebrascensis Thos.	1.49	1.50	2.64	.37	1.66	3.53	1.23	203	1.91
Spharagemon collaris Scudd.					.06			1	.01
Stethophyma lineatum Scudd.	.23	.53	2.83	1.23	.12	.15	.57	121	1.11
Trachyrhachis kiowa Thos.		1.06	.25		.37			76	.73
Nymphs									
Total specimens per environment	2,210	2,062	3,179	811	1,603	652	174	10,853	

MINNESOTA

Small grains

	<u>Percent</u>
1. Melanoplus femur-rubrum -----	21
2. Camnula pellucida -----	21
3. Melanoplus mexicanus -----	16
4. Melanoplus bivittatus -----	14
5. Melanoplus dawsoni -----	6
6. Sixteen other species -----	22
Nymphs, 0	

Legumes

1. Melanoplus femur-rubrum -----	29
2. Melanoplus mexicanus -----	17
3. Camnula pellucida -----	16
4. Melanoplus bivittatus -----	11
5. Melanoplus dawsoni -----	6
6. Twenty other species -----	21
Nymphs, 1.06	

Meadow

1. Melanoplus mexicanus -----	23
2. Camnula pellucida -----	15
3. Encoptolophus sordidus costalis -----	11
4. Ageneotettix deorum -----	9
5. Melanoplus dawsoni -----	3
6. Twenty-one other species -----	34
Nymphs, 0.25	

Pastures

1. Camnula pellucida -----	36
2. Encoptolophus sordidus costalis -----	12
3. Melanoplus bivittatus -----	10
4. Melanoplus femur-rubrum -----	9
5. Melanoplus dawsoni -----	9
6. Nineteen other species -----	24
Nymphs, 0	

Roadside

	<u>Percent</u>
1. Camnula pellucida -----	30
2. Melanoplus bivittatus -----	16
3. Dissosteira carolina -----	15
4. Melanoplus mexicanus -----	9
5. Melanoplus femur-rubrum -----	8
6. Eighteen other species -----	21
Nymphs, 0.37	

Idle land

1. Camnula pellucida -----	37
2. Melanoplus bivittatus -----	13
3. Melanoplus mexicanus -----	10
4. Melanoplus dawsoni -----	9
5. Melanoplus femur-rubrum -----	7
6. Eighteen other species -----	24
Nymphs, 0	

Flax

1. Melanoplus mexicanus -----	37
2. Melanoplus femur-rubrum -----	31
3. Melanoplus bivittatus -----	19
4. Camnula pellucida -----	4
5. Dissosteira carolina -----	4
6. Four other species -----	34
Nymphs, 0	

Environment not shown

1. Camnula pellucida -----	33
2. Melanoplus mexicanus -----	11
3. Dissosteira carolina -----	11
4. Encoptolophus sordidus costalis -----	10
5. Melanoplus bivittatus -----	10
6. Eleven other species -----	25
Nymphs, 0	

Percentage of grand total

1. Camnula pellucida -----	22
2. Melanoplus mexicanus -----	16
3. Melanoplus femur-rubrum -----	15
4. Melanoplus bivittatus -----	11
5. Melanoplus dawsoni -----	7
6. Twenty-five other species -----	31
Nymphs, 0.33	





Distribution by species, of 14,481 specimens collected in Montana, expressed in percentage of total number collected in each habitat-- Continued

Species	Range	Small grains	Rever	Road	Alfalfa	Meadow	Corn	Weeds	Beets	Environment not shown	Mixed	Total	Percentage of age of grand total
Melanoplus bivittatus Say	0.29	3.39	0.42	3.54	2.32	7.24	3.38	---	3.45	5.99	4.24	307	2.12
Melanoplus bowditchi Scudd.	.23	.03	.26	.58	---	---	---	---	---	---	---	26	.18
Melanoplus confusus Scudd.	.35	.24	.05	.36	---	1.21	1.80	---	---	.20	---	69	.48
Melanoplus dawsoni Scudd.	.02	.03	---	.29	.63	---	---	---	---	---	---	13	.09
Melanoplus differentialis Thos.	.10	---	---	---	.18	1.56	---	---	31.03	---	---	27	.19
Melanoplus femur-rubrum Deg.	.85	2.77	.73	1.59	15.65	12.37	---	1.37	---	7.39	27.92	570	3.93
Melanoplus foedus fluviatilis Brun.	---	---	---	---	.09	---	---	---	---	.20	---	2	.01
Melanoplus gladstoni Scudd.	.19	.14	.57	---	.18	---	---	---	---	---	---	27	.19
Melanoplus infantilis Scudd.	2.24	.89	.53	1.01	---	---	.60	---	---	2.99	.25	135	1.23
Melanoplus kennicotti Scudd.	.14	---	---	---	---	---	---	---	---	---	---	7	.05
Melanoplus mexicanus Sauss.	9.77	46.96	69.01	18.70	23.33	25.79	61.68	73.06	41.33	15.97	27.42	4,357	30.08
Melanoplus occidentalis Thos.	1.37	.14	.42	.07	.18	.30	---	---	---	.40	1.00	94	.65
Melanoplus packardii Scudd.	1.12	4.34	4.49	3.68	4.11	2.26	11.93	4.11	---	3.19	9.97	468	3.23
Mermiria maculipennis Brun.	4.25	---	.47	5.27	.18	.30	.50	---	---	---	---	13	.09
Metator pardalinus Sauss.	1.39	.03	.05	---	---	---	---	---	---	---	---	345	2.39
Opeia obscura Thos.	.06	---	---	---	---	---	---	---	---	---	---	74	.51
Orphulella pelidna Burn.	---	---	---	---	---	---	---	---	---	---	---	3	.02
Philobostroma quadrimaculatum Thos.	3.38	.03	.21	.29	---	---	---	---	---	---	---	210	1.45
Phoetaliotes nebrascensis Thos.	.12	.27	---	.22	---	.45	---	---	---	---	.50	19	.13
Spharagemon collaris Scudd.	.14	.48	3.08	.43	1.25	---	1.80	---	---	---	.25	107	.74
Spharagemon equale Say.	.17	.75	.37	.07	---	---	---	---	---	.40	---	39	.27
Trimerotropis campestris McN.	---	---	---	---	---	---	---	---	---	---	---	2	.01
Trimerotropis pallidipennis Burn.	.06	---	---	---	---	---	---	---	---	---	---	---	---
Trachyrhachis kiowa Thos.	2.07	.10	.16	.29	---	---	---	---	---	.20	---	3	.02
Nymphs	29.14	22.57	3.39	30.11	40.41	6.13	6.59	17.35	---	54.09	6.48	3,491	24.09
Total specimens per environment	5,167	2,919	1,913	1,384	1,113	663	167	219	29	501	401	14,481	---

MONTANA

Range

	<u>Percent</u>
1. <i>Aulocara ellioti</i> -----	16
2. <i>Ageneotettix deorum</i> -----	14
3. <i>Melanoplus mexicanus</i> -----	10
4. <i>Metator pardalinus</i> -----	5
5. <i>Phlibostroma quadrimaculata</i> -----	4
6. Thirty-eight other species --	51
Nymphs, 29.14	

Small grains

1. <i>Melanoplus mexicanus</i> -----	47
2. <i>Aulocara ellioti</i> -----	6
3. <i>Melanoplus packardii</i> -----	4
4. <i>Melanoplus bivittatus</i> -----	3
5. <i>Melanoplus femur-rubrum</i> -----	3
6. Twenty-eight other species --	37
Nymphs, 22.57	

Reversion

1. <i>Melanoplus mexicanus</i> -----	69
2. <i>Melanoplus packardii</i> -----	4
3. <i>Melanoplus angustipennis</i> -----	4
4. <i>Spharagemon collare</i> -----	3
5. <i>Ageneotettix deorum</i> -----	3
6. Twenty-three other species --	17
Nymphs, 3.39	

Roadside

1. <i>Melanoplus mexicanus</i> -----	19
2. <i>Aulocara ellioti</i> -----	9
3. <i>Camula pellucida</i> -----	9
4. <i>Ageneotettix deorum</i> -----	5
5. <i>Metator pardalinus</i> -----	5
6. Twenty-eight other species --	53
Nymphs, 30.11	

Alfalfa

1. <i>Melanoplus mexicanus</i> -----	23
2. <i>Melanoplus femur-rubrum</i> -----	16
3. <i>Camula pellucida</i> -----	5
4. <i>Melanoplus packardii</i> -----	4
5. <i>Aulocara ellioti</i> -----	3
6. Seventeen other species -----	39
Nymphs, 40.41	

Meadow

	<u>Percent</u>
1. <i>Camula pellucida</i> -----	30
2. <i>Melanoplus mexicanus</i> -----	26
3. <i>Melanoplus femur-rubrum</i> -----	12
4. <i>Aulocara ellioti</i> -----	9
5. <i>Melanoplus bivittatus</i> -----	7
6. Thirteen other species -----	16
Nymphs, 6.18	

Corn

1. <i>Melanoplus mexicanus</i> -----	62
2. <i>Melanoplus packardii</i> -----	12
3. <i>Melanoplus bivittatus</i> -----	8
4. <i>Camula pellucida</i> -----	2
5. <i>Dissosteira carolina</i> -----	2
6. Seven other species -----	14
Nymphs, 6.59	

Weeds

1. <i>Melanoplus mexicanus</i> -----	73
2. <i>Melanoplus packardii</i> -----	4
3. <i>Aulocara ellioti</i> -----	2
4. <i>Melanoplus femur-rubrum</i> -----	1
5. <i>Camula pellucida</i> -----	1
6. Four other species -----	20
Nymphs, 17.35	

Beets

1. <i>Melanoplus mexicanus</i> -----	41
2. <i>Melanoplus differentialis</i> -----	31
3. <i>Aeoloplus turnbulli</i> -----	24
4. <i>Melanoplus bivittatus</i> -----	4
Nymphs, 0	

Environment not shown

1. <i>Melanoplus mexicanus</i> -----	16
2. <i>Melanoplus femur-rubrum</i> -----	7
3. <i>Melanoplus bivittatus</i> -----	6
4. <i>Aulocara ellioti</i> -----	4
5. <i>Melanoplus packardii</i> -----	3
6. Nine other species -----	64
Nymphs, 54.09	

MONTANA--Continued

<u>Mixed environment</u>		<u>Percentage of grand total</u>	
	<u>Percent</u>		
1. <i>Melanoplus femur-rubrum</i> -----	28	1. <i>Melanoplus mexicanus</i> -----	30
2. <i>Melanoplus mexicanus</i> -----	27	2. <i>Aulocara ellioti</i> -----	9
3. <i>Melanoplus packardii</i> -----	10	3. <i>Ageneotettix deorum</i> -----	7
4. <i>Carmula pellucida</i> -----	8	4. <i>Melanoplus femur-rubrum</i> -----	4
5. <i>Aulocara ellioti</i> -----	2	5. <i>Carmula pellucida</i> -----	4
6. Thirteen other species -----	25	6. Forty-four other species -----	46
Nymphs, 6.48		Nymphs, 24.09	

NEBRASKA

Except for the large sand-hill area in the middle of the State, there were severe infestations throughout the eastern and southern parts and threatening outbreaks in the western part. Of the 11,038 specimens collected in the State, *M. mexicanus* was the most numerous, *Cordillacris occipitalis* was second, and *M. angustipennis*, *M. differentialis*, and *M. bivittatus* next in numbers. No collections were made in 1936, but in 1935 *M. femur-rubrum* was most numerous among the specimens collected in the eastern part of the State. *Cordillacris occipitalis* did not appear in the collections that year. A second generation of *M. mexicanus* occurred in the State in 1937 and numbered from 15 to 100 per square yard. This generation damaged winter wheat so severely that a second control campaign was necessary in the fall. A large percentage of the 11,038 specimens were nymphs, probably of *M. mexicanus*.



Distribution by species of 11,083 specimens collected in Nebraska, expressed in percentage of total number collected in each habitat

Species	Creek : bottom:	Prairie:	Environ- ment not shown	Log- umes:	Corn:land	Idle :	Small:Road- grains:side	Total : speci- mens :	Percent- age of grand total
<i>Aeolopus turnbulli</i> Thos.	0.75	1.43	2.27	2.16	--	2.52	3.01	235	2.12
<i>Ageneotettix deorum</i> Scudd.	6.33	5.30	5.35	1.47	--	6.36	6.61	471	4.24
<i>Aeropedellus clavatus</i> Thos.	--	--	--	--	--	--	--	--	--
<i>Acrolophus hirtipes</i> Say	--	0.15	0.05	--	--	0.11	--	3	0.03
<i>Aulocara elliotti</i> Thos.	11.14	4.89	2.53	0.09	--	10.85	8.11	426	3.83
<i>Amphiternus coloratus</i> Thos.	1.66	1.19	1.13	--	--	3.3	3.11	105	0.95
<i>Brachystola magna</i> Gir.	--	--	0.05	0.06	--	--	--	3	0.03
<i>Boopedon nubilum</i> Say	--	.44	--	0.03	--	--	--	4	0.04
<i>Chorthippus longicernis</i> Latr.	--	--	0.09	--	--	--	--	2	0.02
<i>Cordillacris crenulata</i> Brun.	--	0.15	2.22	--	--	2.2	1.99	89	0.80
<i>Conocephalus concinnus</i> delicaturn Brun.	1.20	--	--	--	--	--	--	8	0.07
<i>Card. occipitalis</i> Thos.	15.36	9.64	1.27	--	--	19.84	13.37	626	5.53
<i>Derotema haydenii</i> Thos.	0.30	--	0.59	0.90	--	--	--	48	0.43
<i>Dichrorhiza viridis</i> Scudd.	--	--	0.05	--	--	--	--	1	0.01
<i>Dissosteira carolina</i> L.	0.30	0.30	0.14	1.00	--	--	0.38	13	0.12
<i>Dissosteira longipennis</i> Thos.	--	--	0.05	--	--	0.11	--	2	0.02
<i>Drepanopterna feroratum</i> Scudd.	--	1.78	1.63	--	--	5.53	--	151	1.35
<i>Dactyloctenium pictum</i> Thos.	--	0.15	0.09	--	--	--	--	3	0.03
<i>Encyrtolophus sordidus costalis</i> Scudd.	--	--	--	0.39	--	--	--	14	0.13
<i>Hadrotettix trifasciatus</i> Say	--	--	0.36	0.06	--	--	0.27	17	0.15
<i>Hypochoera alba</i> Dodge	--	--	0.14	--	--	--	--	3	0.03
<i>Hesperotettix viridis</i> Thos.	0.45	1.19	0.32	0.03	--	0.11	0.16	40	0.36
<i>Hippiscus rugosus</i> Scudd.	--	--	--	--	--	--	0.05	1	0.01
<i>Melanoplus angustipennis</i> Dodge	2.41	3.71	4.26	4.77	--	2.74	11.92	590	5.31
<i>Melanoplus bivittatus</i> Say	3.01	0.89	7.52	4.92	1.00	0.22	0.43	452	4.16
<i>Melanoplus confusus</i> Scudd.	0.60	0.89	0.23	0.12	--	0.11	0.97	41	0.37
<i>Melanoplus differentialis</i> Thos.	1.81	6.38	6.02	7.29	6.50	2.19	--	535	4.82
<i>Melanoplus flavidus flavidus</i> Scudd.	0.30	0.59	1.00	0.12	--	--	1.99	91	0.82
<i>Melanoplus femur-rubrum</i> Deg.	3.01	0.59	5.30	5.16	--	0.77	0.05	334	3.01
<i>Melanoplus foedus foedus</i> Scudd.	4.37	2.67	1.99	2.61	--	1.42	2.04	277	2.49
<i>Melanoplus foedus fluviatilis</i> Brun.	0.15	--	0.09	0.09	--	0.44	--	10	0.09

Distribution by species of 11,023 specimens collected in Nebraska, expressed in percentage of total number collected in each habitat--Continued

Species	Creek : :bottom:	Prairie:	Environ-: :shown:	Leg- :umes	Corn:land	Idle :	Range:grains:	Small :Road-:	Total :Percent-: :speci-: age of : mens :grand total
Melanoplus gladstoni Scudd.	---	---	0.09:	---	---	---	---	0.19:	Number: 5:
Melanoplus keeleri luridus Dodge	---	---	.05:	---	---	---	---	---	1:
Melanoplus mexicanus Sauss.	4.52:	13.79:	17.62:	15.21:	1.50:	6.77:	1.88:	32.63:	4.46: 1,350:
Melanoplus lakinus Scudd.	---	---	.14:	.24:	---	---	---	---	11:
Melanoplus occidentalis Thos.	---	.74:	.95:	.03:	---	1.86:	2.79:	---	97:
Melanoplus packardii Scudd.	.15:	2.52:	1.68:	1.65:	---	.88:	.81:	1.32:	1.00: 149:
Melanoplus regalis Dodge	---	---	.27:	---	---	---	---	---	6:
Melanoplus sp.	---	2.22:	---	---	---	---	---	---	15:
Mermiria maculipennis Brun.	.60:	1.78:	.54:	.03:	---	5.92:	.70:	---	98:
Mermiria maculipennis macclungi Rehn:	---	---	---	---	---	---	---	---	2:
Metator paralinus Sauss.	13.10:	.30:	.05:	---	---	1.97:	.38:	.19:	116:
Orphulella speciosa Scudd.	---	---	---	---	---	.11:	---	.19:	2:
Orphulella pelidna Burm.	---	---	.14:	---	---	---	---	---	3:
Cpeia obscura Thos.	---	3.71:	.05:	---	---	---	.11:	---	28:
Paropomala wyomingensis Thos.	---	---	.14:	---	---	.11:	.54:	---	14:
Phlib. quadrimaculatum Thos.	.30:	4.45:	6.12:	---	---	.33:	7.46:	---	309:
Phoetaliotes nebrascensis Thos.	---	.44:	.32:	.06:	---	---	.21:	---	17:
Schistocerca lineata Scudd.	---	---	---	---	---	---	.05:	---	1:
Spharagemon collare Scudd.	1.81:	.74:	1.04:	.87:	---	1.32:	1.29:	2.26:	1.00: 126:
Spharagemon equale Say	.15:	---	.41:	.03:	---	1.10:	.48:	.57:	33:
Trachyrhachis kiowa Thos.	4.97:	4.15:	3.35:	.26:	---	3.84:	3.76:	---	.11: 243:
Trimerotropis agrestis McN.	---	---	---	---	---	---	.11:	---	2:
Trimerotropis pallidipennis Burm.	---	---	.09:	---	---	---	---	---	2:
Xanthipus corallipes Hald.	---	---	---	---	---	---	.05:	---	1:
Nymphs	21.23:	19.72:	21.61:	51.12:	---	25.43:	19.76:	32.63:	69.30: 3,849:
Undetermined	---	---	---	.09:	---	---	---	---	3:
Total specimens per environment	664 :	674 :	2,206 :	3,324 :	20 :	912:	1,862 :	530 :	896 : 11,023:

NEBRASKA

Creek bottom

	<u>Percent</u>
1. Cordillacris occipitalis -----	15
2. Metator pardalinus -----	13
3. Aulocara eliotti -----	11
4. Ageneotettix decorum -----	6
5. Trachyrhachis kiowa -----	5
6. Twenty-one other species -----	50
Nymphs, 21.23	
Undetermined, 0	

Idle land

	<u>Percent</u>
1. Cordillacris occipitalis -----	20
2. Aulocara eliotti -----	11
3. Melanoplus mexicanus -----	9
4. Ageneotettix decorum -----	6
5. Merniria maculipennis -----	6
6. Twenty-three other species -----	48
Nymphs, 25.43	
Undetermined, 0	

Frairie

1. Melanoplus mexicanus -----	14
2. Cord. occipitalis -----	10
3. Ageneotettix decorum -----	8
4. Melanoplus differentialis -----	6
5. Aulocara eliotti -----	5
6. Thirty-one other species -----	57
Nymphs, 19.72	
Undetermined, 0	

Range

1. Cord. occipitalis -----	13
2. Melanoplus angustipennis -----	12
3. Aulocara eliotti -----	8
4. Philibostroma quadrimaculatum	7
5. Ageneotettix decorum -----	7
6. Twenty-seven other species -----	53
Nymphs, 19.76	
Undetermined, 0	

Environment not shown

1. Melanoplus mexicanus -----	18
2. Melanoplus bivittatus -----	8
3. Philibostroma quadrimaculatum --	6
4. Melanoplus differentialis -----	6
5. Ageneotettix decorum -----	5
6. Forty-one other species -----	57
Nymphs, 21.61	
Undetermined, 0	

Small grains

1. Melanoplus mexicanus -----	37
2. Melanoplus angustipennis -----	7
3. Melanoplus foedus foedus ----	9
4. Melanoplus flavidus flavidus	4
5. Aeoloplus turnbulli -----	4
6. Sixteen other species -----	39
Nymphs, 32.63	
Undetermined, 0	

Legumes

1. Melanoplus mexicanus -----	15
2. Melanoplus differentialis -----	7
3. Melanoplus femur-rubrum -----	5
4. Melanoplus bivittatus -----	5
5. Melanoplus angustipennis -----	5
6. Twenty-two other species -----	63
Nymphs, 0	
Undetermined, 0	

Roadside

1. Melanoplus bivittatus -----	10
2. Melanoplus differentialis --	7
3. Melanoplus mexicanus -----	4
4. Melanoplus angustipennis --	6
5. Melanoplus flavidus flavidus	4
6. Seventeen other species ----	69
Nymphs, 69.30	
Undetermined, 0	

Percentage of grand total

1. Melanoplus mexicanus -----	12
2. Cord. occipitalis -----	6
3. Melanoplus angustipennis -----	5
4. Melanoplus differentialis -----	5
5. Melanoplus bivittatus -----	4
6. Fifty-three other species -----	58
Nymphs, 34.64	
Undetermined, 0	



NEW MEXICO

The northeastern portion of the State was the most heavily infested, with Dissosteira longipennis as the most important species. This is not shown in the 713 specimens collected, among which Melanoplus femur-rubrum ranks first in numbers and D. longipennis second.

Distribution by species of 713 specimens collected in New Mexico, expressed in percentage of total number collected in each habitat

Species	Environment: not shown	Range	Roadside	Native: sod	Total specimens	Percentage of grand total
Ageneotettix deorum Scudd.	--	11.51	--	--	35	4.91
Arphia pseudonietana Thos.	--	--	--	20.00	1	0.14
Aulocara ellioti Thos.	--	2.30	--	--	7	0.98
Brachystola magna Gir.	--	1.32	--	--	4	0.56
Camula pellucida Scudd.	0.75	--	--	--	3	0.42
Campylacantha olivacea Scudd.	--	10.52	--	--	32	4.49
Cordillacris crenulata Brun.	--	2.33	--	--	1	0.14
Dactylotum pictum Thos.	--	3.33	--	--	1	0.14
Derotmena haydeni Thos.	--	2.98	--	--	1	0.14
Dissosteira carolina U.	--	1.86	--	--	2	0.28
Dissosteira longipennis Thos.	31.15	3.62	--	20.00	136	19.07
Drepanopterna femoratus Scudd.	0.25	--	--	--	1	0.14
Encyrtolophus sordidus Brun.	1.75	27.96	--	--	92	12.90
Hadrotettix trifasciatus Say	0.75	0.99	--	--	3	0.42
Hesperotettix viridis Thos.	--	1.32	--	--	4	0.56
Melanoplus bivittatus Say	2.26	1.64	--	--	14	1.96
Melanoplus femur-rubrum Deg.	48.73	1.32	--	--	195	27.76
Melanoplus foedus fcedus Scudd.	3.27	4.23	--	--	25	3.65
Melanoplus flavus flavus Scudd.	--	0.99	--	--	3	0.42
Melanoplus flavus Scudd.	3.01	--	--	--	12	1.68
Melanoplus differentialis Thos.	4.02	1.32	--	--	20	2.80
Melanoplus glastoli Scudd.	2.01	--	--	20.00	9	1.26
Melanoplus lakinus Scudd.	0.25	2.63	--	--	9	1.26
Melanoplus mexicanus Sauss.	--	4.93	--	--	15	2.10
Melanoplus occidentalis Thos.	0.25	--	--	20.00	2	0.28
Melanoplus packardii Scudd.	--	3.33	--	--	1	0.14
Mermiria neomexicana Thos.	--	0.66	--	--	1	0.14
Merniria sp.	--	0.33	--	--	1	0.14
Paropomola wvoningensis Thos.	--	0.99	--	--	3	0.42
Philib. quadrimaculatum Thos.	0.25	3.62	--	--	12	1.68
Spharagemon collaris Scudd.	--	1.66	--	--	2	0.28
Schistocerca sp.	--	1.32	16.67	--	5	0.70
Schistocerca lineata Scudd.	--	--	33.33	--	2	0.28
Schistocerca shoshone Thos.	--	3.29	--	--	12	1.68
Trachynachis Kiowa Thos.	0.50	--	--	--	1	0.14
Trimerotropis laticincta Sauss.	0.25	--	--	20.00	3	0.42
Trimerotropis pallidipennis Burn.	0.50	--	--	--	27	3.79
Undetermined	--	7.89	50.00	--	--	--
Total specimens per environment	398	304	6	5	713	--

NEW MEXICO

<u>Environment not shown</u>		<u>Roadside</u>	
	<u>Percent</u>		<u>Percent</u>
1. <i>Melanoplus femur-rubrum</i> -----	49	1. <i>Schistocerca shoshone</i> -----	33
2. <i>Dissosteira longipennis</i> -----	31	2. <i>Schistocerca lineata</i> -----	17
3. <i>Melanoplus gladstoni</i> -----	4	3. One other species -----	50
4. <i>Melanoplus foedus foedus</i> -----	3	Undetermined adults, 50	
5. <i>Melanoplus differentialis</i> -----	3		
6. Twelve other species -----	10		
Undetermined adults, 0			

<u>Range</u>		<u>Native sod</u>	
1. <i>Encyrtolophus sordidus</i> -----	28	1. <i>Arphia pseudonietana</i> -----	20
2. <i>Ageneotettix deorum</i> -----	12	2. <i>Dissosteira longipennis</i> -----	20
3. <i>Campylacantha olivacea</i> -----	11	3. <i>Melanoplus lakinus</i> -----	20
4. <i>Melanoplus occidentalis</i> -----	5	4. <i>Melanoplus packardii</i> -----	20
5. <i>Melanoplus foedus foedus</i> -----	4	5. <i>Trimerotropis pallidipennis</i> -----	20
6. Twenty-three other species -----	40		
Undetermined adults, 3			

Percentage of grand total

1. <i>Melanoplus femur-rubrum</i> -----	28
2. <i>Dissosteira longipennis</i> -----	19
3. <i>Encyrtolophus sordidus</i> -----	13
4. <i>Ageneotettix deorum</i> -----	5
5. <i>Campylacantha olivacea</i> -----	4
6. Thirty-two other species -----	31
Undetermined adults, 4	

NORTH DAKOTA

Of the 24,961 specimens collected in North Dakota, about 60 percent were *Melanoplus mexicanus*. *Ageneotettix deorum* Scudd. was next in numbers and *Metator pardalinus* Sauss., *Camula pellucida*, and *Melanoplus femur-rubrum* next in order of abundance. The outbreaks in 1938 were composed mainly of *M. mexicanus*, which hatched in enormous numbers in grain stubble, idle land, and rangeland adjacent to crops.



Distribution by species of 24,961 specimens collected in North Dakota, expressed in percentage of total number collected in each habitat

Species	:Small:Idle:	:grain:land:Range:	Weeds:	:Mea-:Road-:Rever-:	:Leg-:Pas-:River:Total:	Percent-:
	:sion	:Corn:unes:tire:bot-:speci-:	:age of			
	:men-:mens:grand total					
Aeoloplus turnbulli bruneri Gaud.	0.12:1.66:	0.17:	0.07:	0.90:	104:	0.42
Aerochoreutes carlinianus Thos.	0.12:	0.12:	0.07:	0.90:	104:	0.01
Aeropedellus clavatus Thos.	0.04:	0.37:	0.07:	0.90:	104:	0.14
Acrolophitus hirtipes Say	0.02:	0.02:	0.07:	0.90:	104:	0.01
Ageneotettix deorum Scudd.	1.31:2.00:25.49:	1.31:2.00:25.49:	3.73:	3.97:2.03:3.19:5.87:15.67:	1,891:	7.56
Amphitornus coloratus Thos.	0.01:	3.22:	0.07:	1.59:	200:	0.80
Arphia pseudonietana Thos.	0.04:	0.04:	0.07:	0.90:	104:	0.02
Aulacara elliotti Thos.	0.47:	0.45:10.19:	0.95:	0.79:	676:	2.70
Bruneria brunnea Thos.	0.37:	0.37:	0.07:	0.90:	104:	0.09
Camula pellucida Scudd.	4.57:	0.23:3.55:	2.18:	14.28:1.13:	398:	3.59
Chorthippus longicornis Latr.	0.02:	0.13:	0.22:	0.23:	26:	0.10
Cordillacris crenulata Brun.	0.06:	0.06:	0.07:	0.07:	3:	0.01
Cordillacris occipitalis Thos.	0.13:	0.13:	0.07:	0.07:	7:	0.03
Dactylotum pictum Thos.	0.02:	0.02:	0.07:	0.07:	2:	0.01
Deretnema haydenii Thos.	0.04:	0.09:	0.07:	0.07:	21:	0.08
Dissosteira carolina L.	1.04:	0.27:	0.37:	1.81:	155:	0.62
Drepanopterna femoratus Scudd.	0.01:	0.02:	0.29:	0.29:	88:	0.35
Enceptolophus sciridus costalis Scudd.	0.23:	0.05:	0.07:	0.68:	110:	0.44
Hadrotettix trifasciatus Say	0.07:	0.16:	0.29:	0.12:	35:	0.14
Hesperotettix viridis Thos.	0.09:	0.23:	0.58:	0.79:	66:	0.26
Hypochlora alba Dodge	0.01:	0.07:	0.07:	0.07:	5:	0.02
Melanoplus angustipennis Dodge	0.32:	1.13:	0.15:	0.68:	120:	0.48
Melanoplus bivittatus Say	1.30:	2.02:	3.93:	2.93:6.77:	338:	1.35
Melanoplus bowditchi Scudd.	0.01:	0.02:	0.07:	0.07:	2:	0.01
Melanoplus bruneri Scudd.	0.01:	0.07:	0.07:	0.07:	2:	0.01
Melanoplus confusus Scudd.	0.01:	0.32:	0.07:	0.30:	21:	0.08
Melanoplus dawsoni Scudd.	0.26:	0.07:	0.37:	0.40:2.46:	143:	0.57
Melanoplus differentialis Thos.	0.02:	0.07:	0.51:	0.51:	9:	0.04
Melanoplus femur-rubrum Deg.	4.21:	5.03:	3.49:	3.17:4.74:7.97:1.41:	856:	3.42
Melanoplus flavidus Scudd.	0.08:	0.02:	0.07:	0.07:	10:	0.04
Melanoplus gladstoni Scudd.	0.54:	0.58:	0.44:	2.38:	139:	0.56



NORTH DAKOTA

Small grains

Percent

1.	Melanoplus mexicanus -----	77
2.	Camnula pellucida -----	5
3.	Melanoplus packardii -----	4
4.	Melanoplus femur-rubrum ----	4
5.	Ageneotettix deorum -----	2
6.	Thirty other species -----	8
	Nymphs, 0.64	

Range

1.	Ageneotettix deorum -----	25
2.	Melanoplus mexicanus -----	14
3.	Metator pardalinus -----	13
4.	Aulocara ellioti -----	10
5.	Phlibostroma quadrimaculatum	5
6.	Thirty-nine other species -	33
	Nymphs, 5.61	

Meadow

1.	Melanoplus mexicanus -----	41
2.	Camnula pellucida -----	10
3.	Ageneotettix deorum -----	10
4.	Melanoplus infantilis -----	5
5.	Metator pardalinus -----	4
6.	Twenty-seven other species -	30
	Nymphs, 7.38	

Reversion

1.	Melanoplus mexicanus -----	47
2.	Trachyrhachis kiowa -----	17
3.	Camnula pellucida -----	14
4.	Ageneotettix deorum -----	4
5.	Melanoplus packardii -----	3
6.	Eight other species -----	15
	Nymphs, 0	

Legumes

1.	Melanoplus mexicanus -----	72
2.	Melanoplus femur-rubrum ----	8
3.	Melanoplus bivittatus -----	7
4.	Melanoplus packardii -----	5
5.	Ageneotettix deorum -----	3
6.	Five other species -----	5
	Nymphs, 0	

Idle land

Percent

1.	Melanoplus mexicanus -----	75
2.	Melanoplus packardii -----	6
3.	Melanoplus femur-rubrum ----	5
4.	Ageneotettix deorum -----	2
5.	Melanoplus bivittatus -----	2
6.	Twenty-one other species ----	10
	Nymphs, 2.22	

Weeds

1.	Melanoplus mexicanus -----	76
2.	Melanoplus packardii -----	7
3.	Melanoplus femur-rubrum ----	7
4.	Ageneotettix deorum -----	1
5.	Spharagemon collare -----	1
6.	Eleven other species -----	8
	Nymphs, none	

Roadside

1.	Melanoplus mexicanus -----	65
2.	Melanoplus packardii -----	7
3.	Metator pardalinus -----	5
4.	Melanoplus bivittatus -----	4
5.	Ageneotettix deorum -----	4
6.	Twenty-three other species --	15
	Nymphs, 1.89	

Corn

1.	Melanoplus mexicanus -----	76
2.	Melanoplus packardii -----	6
3.	Melanoplus femur-rubrum ----	5
4.	Melanoplus bivittatus -----	3
5.	Ageneotettix deorum -----	2
6.	Nine other species -----	8
	Nymphs, 0	

Pasture

1.	Melanoplus mexicanus -----	46
2.	Melanoplus infantilis -----	8
3.	Camnula pellucida -----	6
4.	Ageneotettix deorum -----	6
5.	Metator pardalinus -----	5
6.	Nineteen other species -----	29
	Nymphs, 3.87	



<u>River bottom</u>		<u>Percentage of grand total</u>	
<u>Percent</u>			
1. Melanoplus mexicanus -----	32	1. Melanoplus mexicanus -----	60
2. Ageneotettix deorum -----	17	2. Ageneotettix deorum -----	8
3. Aulocara elliotti -----	9	3. Metator pardalinus -----	4
4. Melanoplus packardii -----	9	4. Cammula pellucida -----	4
5. Trachyrhachis kiowa -----	6	5. Melanoplus femur-rubrum -----	3
6. Eleven other species -----	27	6. Forty-four other species -----	21
Nymphs, 0		Nymphs, 2.42	

OKLAHOMA

In Oklahoma 9,244 specimens were collected. Of these M. differentialis was by far the most numerous. The worst infestations were in the central and southwestern parts of the State.



Distribution by species of 9,244 specimens collected in Oklahoma, expressed in percentage of total number collected in each habitat--Continued

Species	Small : grains:ume	Leg- ume	Corn	Pas- ture	Range	Road- side	River:Weedy: bot- tom	Cotton:	Miscel- lane- ous	Environ- ment given	Total : speci- mens	Percent- age of grand total
Melanoplus differentialis Thos.	14.36	40.13	60.03	14.18	8.95	21.82	0.89	29.93	16.00	0.38	1,507	19.52
Melanoplus femur-rubrum Deg.	--	.08	--	--	--	--	2.22	.37	5.72	--	51	.55
Melanoplus flavius Scudd.	--	--	.67	--	1.17	.14	--	1.59	--	7.87	124	1.34
Melanoplus foedus foedus Scudd.	.57	--	--	--	.81	--	--	2.21	--	1.91	51	.55
Melanoplus foedus fluvialis Bruner	--	.89	1.34	12.68	.44	.29	--	2.57	9.03	5.21	283	3.06
Melanoplus foedus iselyi Hebard	6.75	4.29	5.21	8.64	2.57	13.01	--	29.19	3.17	14.73	689	7.44
Melanoplus glaucipes Scudd.	.95	.24	.13	.19	2.54	1.73	--	6.86	.63	--	124	1.34
Melanoplus lakinus Scudd.	.95	--	.13	.09	.51	1.88	3.11	.12	--	--	40	.43
Melanoplus mexicanus Sauss.	7.70	15.53	11.61	3.10	1.84	3.03	.44	2.70	17.11	.32	575	6.21
Melanoplus occidentalis Thos.	--	--	--	--	.66	.14	--	--	--	--	10	.11
Melanoplus oklahomae Hebard	--	--	--	--	--	--	--	--	--	.16	1	.01
Melanoplus packardii Scudd.	11.51	16.10	.80	10.99	16.37	.87	1.78	3.31	8.55	1.91	774	8.36
Melanoplus ponderosus ponderosus Scudd.	--	--	--	--	--	--	--	--	--	1.91	15	.16
Melanoplus ponderosus viola Thos.	--	--	--	--	--	--	--	--	--	.13	1	.01
Melanoplus regalis Dodge	.48	--	--	--	1.03	--	2.22	.37	--	3.56	69	.75
Melanoplus scudderii scudderii Thal.	--	--	--	--	--	--	--	--	--	--	3	.03
Melanoplus texanus Scudd.	--	--	--	--	--	--	--	.37	--	.13	4	.04
Mermiria bivittata Serville	--	.08	--	.38	.22	--	--	--	--	.13	9	.10
Mermiria maculipennis Brun.	--	.81	--	2.35	1.03	4.62	--	.12	--	3.05	106	1.14
Metator pardalinus Sauss.	--	--	--	--	.07	--	.44	--	--	.48	5	.05
Orphulella pelidna Burm.	.10	--	--	--	--	--	--	--	--	.64	6	.06
Orphulella speciosa Scudd.	--	--	--	--	--	.14	--	--	--	--	1	.01
Pardalophora apiculata Harris	--	--	--	--	--	--	--	--	--	--	1	.01
Paratylotropidia brunneri Scudd.	--	--	--	--	--	--	--	.37	--	.13	3	.03





OKLAHOMA

Small grains

	<u>Percent</u>
1. Melanoplus differentialis	14
2. Aulocara ellioti	12
3. Melanoplus packardii	12
4. Melanoplus angustipennis	
impiger	10
5. Phlibostroma quadrimaculatum	10
6. Twenty-four other species	42
Nymphs,	0.76

Legumes

1. Melanoplus differentialis	40
2. Melanoplus packardii	16
3. Melanoplus mexicanus	16
4. Melanoplus bowditchi bowditchi	9
5. Melanoplus bivittatus	5
6. Fifteen other species	14
Nymphs,	0

Corn

1. Melanoplus differentialis	60
2. Melanoplus mexicanus	12
3. Melanoplus bivittatus	9
4. Melanoplus foedus iselyi	5
5. Hesperotettix speciosus	3
6. Twelve other species	11
Nymphs,	0

Pasture

1. Melanoplus angustipennis	
impiger	15
2. Melanoplus differentialis	14
3. Melanoplus foedus flaviatilis	13
4. Melanoplus packardii	11
5. Melanoplus foedus iselyi	9
6. Twenty-one other species	38
Nymphs,	0

Roadside

	<u>Percent</u>
1. Melanoplus differentialis	22
2. Melanoplus foedus iselyi	13
3. Melanoplus angustipennis impiger	12
4. Melanoplus bispinosus	8
5. Ageneotettix deorum	7
6. Twenty-one other species	38
Nymphs,	0

River bottom

1. Aulocara ellioti	42
2. Phlibostroma quadrimaculatum	28
3. Melanoplus bivittatus	5
4. Ageneotettix deorum	4
5. Melanoplus lakinus	3
6. Thirteen other species	18
Nymphs,	0

Weedy patches

1. Melanoplus differentialis	30
2. Melanoplus foedus iselyi	29
3. Melanoplus impiger	10
4. Melanoplus glaucipes	7
5. Hesperotettix speciosus	6
6. Twenty-seven other species	18
Nymphs,	0.98

Cotton

1. Melanoplus mexicanus	17
2. Melanoplus differentialis	16
3. Trimerotropis citrina	12
4. Melanoplus angustipennis	
impiger	11
5. Melanoplus bivittatus	9
6. Fifteen other species	35
Nymphs,	0

OKLAHOMA--Continued

<u>Range</u>	<u>Percent</u>	<u>Miscellaneous</u>	<u>Percent</u>
1. Melanoplus packardii -----	16	1. Melanoplus foedus iselyi -----	15
2. Phlibostroma quadrimaculatum	16	2. Dissosteira carolina -----	8
3. Melanoplus angustipennis		3. Melanoplus flavidus -----	8
impiger -----	11	4. Chortophaga viridi-fasciata ---	7
4. Melanoplus differentialis ---	9	5. Melanoplus confusus -----	5
5. Aulocara ellioti -----	7	6. Thirty-nine other species -----	57
6. Thirty-four other species ---	46	Nymphs, 0	
Nymphs, 0.29			
<u>Environment not shown</u>		<u>Percentage of grand total</u>	
1. Phlibostroma quadrimaculatum	26	1. Melanoplus differentialis ----	20
2. Aulocara ellioti -----	14	2. Melanoplus packardii -----	8
3. Melanoplus impiger -----	13	3. Melanoplus foedus iselyi -----	7
4. Hesperotettix viridis -----	10	4. Melanoplus angustipennis	
		impiger -----	7
5. Spharagemon equale -----	8	5. Phlibostroma quadrimaculatum -	7
6. Twenty-two other species ---	29	6. Sixty-six other species -----	51
Nymphs, 0		Nymphs, 0.22	



SOUTH DAKOTA

Of the 12,772 specimens collected in South Dakota about 46 percent were Melanoplus mexicanus. This species hatched out in 1938 in great numbers in idle land, stubble, and peppergrass prairie land adjacent to crops. One field of untenanted reverted land averaged over 1,500 per square yard on 160 acres--enough hoppers to destroy all of the grain on 15 sections. Some of the peppergrass prairie had populations of 3,000 per square yard. Such dense populations thin out to at least 40 to 50 per square yard by the time the hoppers are adult, chiefly by spreading. Most farmers are reluctant to poison hoppers on land belonging to other people or on untenanted reverted land. They should realize that hoppers do not respect property lines any more than they do property rights. Where such places are a menace to adjacent farms poisoning them off before they get into the crops becomes a community problem.

Distribution by species of 12,772 specimens collected in South Dakota, expressed in percentage of total number collected in each habitat

Species	:Small :Road :Pas- :Leg- : : :River:Environ-:Rever-:Mead-: :Total : Percent- :grains:side :ture :umes:Weeds:Range:bot- :ment not: sion : ow :Corn:speci-: age of : : : : : : : : : : : : : : mens : grand total											
Acrolophitus hirtipes Say	2.45	1.03	5.17	0.43	1.40	0.04	0.58	3.83	1.51	226	1	0.01
Aeoloplus turnbulli bruneri Caud.	0.02	3.38	13.93	5.46	5.14	14.98	3.49	2.32	19.61	27.77	1.51	1.76
Aeropedellus clavatus Thos.	3.38	17	2.34	25	2.31	23	29	6.70	47	118	2	1.18
Ageneotettix deorum Scudd.	0.02	3.38	13.93	5.46	5.14	14.98	3.49	2.32	19.61	27.77	1.51	1.076
Agathornus coloratus Thos.	0.02	3.38	13.93	5.46	5.14	14.98	3.49	2.32	19.61	27.77	1.51	1.076
Arctia pseudonietana Thos.	2.74	1.74	7.26	3.1	8.41	21.39	7.0	4.93	10.52	1.87	1.51	6.62
Aulocara elliotti Thos.	0.03	0.03	19	06	1.21	23	03	03	03	35	5	0.27
Boopedon nubilum Say	0.03	0.03	19	06	1.21	23	03	03	03	35	5	0.04
Brachystola magna Gir.	0.14	0.25	0.25	12	16	16	16	2.39	1.72	34	1	0.27
Camula pellucida Scudd.	0.03	0.03	19	06	1.21	23	03	03	03	35	5	0.01
Chloealtis conspersa Harr.	0.03	0.03	19	06	1.21	23	03	03	03	35	5	0.13
Chorthippus longicornis Latr.	0.25	0.25	50	50	39	39	29	48	50	29	1	0.26
Comillacris crenulata Brun.	0.02	0.41	1.17	25	12	12	29	48	50	29	1	0.15
Comillacris occipitalis Thos.	0.02	0.41	1.17	25	12	12	29	48	50	29	1	0.01
Dactyloctenium pictum Thos.	0.02	0.41	1.17	25	12	12	29	48	50	29	1	0.23
Derotmema haydeni Thos.	0.02	0.41	1.17	25	12	12	29	48	50	29	1	0.09
Diaperomera femorata Say	0.02	0.41	1.17	25	12	12	29	48	50	29	1	0.01
Diaperomera velii Walsh	0.86	0.17	0.17	12	47	47	47	47	47	45	45	0.35
Dissosteira carolina L.	0.05	0.05	0.05	05	47	47	47	47	47	45	45	0.02
Dissosteira longipennis Thos.	0.05	0.05	0.05	05	47	47	47	47	47	45	45	0.17
Drepanopterna femoratum Scudd.	0.03	0.03	0.25	25	70	70	70	70	70	22	22	0.01
Eritettix simplex	0.03	0.03	0.25	25	70	70	70	70	70	22	22	0.02
tricarlinatus Thos.	0.03	0.03	0.25	25	70	70	70	70	70	22	22	0.01
Hadrotettix trifasciatus Say	0.29	0.17	0.08	19	08	08	23	23	16	1.01	1	0.19
Hesperotettix speciosus Scudd.	0.10	0.08	0.08	12	04	04	1.40	1.40	1.16	15	15	0.12
Hesperotettix viridis Thos.	0.07	0.91	0.12	12	35	35	1.74	1.74	1.72	42	42	0.33
Hippiscus rufosus Scudd.	0.02	0.02	0.02	02	08	08	29	29	1.72	1	1	0.01
Hypochlora alba Dodge	0.02	0.02	0.02	02	08	08	29	29	1.72	1	1	0.02
Melanoplus angustipennis Dodge	0.58	1.32	0.75	12	16	16	2.33	2.33	16	3.02	73	0.57
Melanoplus bivittatus Say	5.14	6.38	1.50	6.09	3.74	59	9.07	6.67	5.30	7.54	541	4.22
Melanoplus confusus Scudd.	1.06	3.39	2.75	43	1.87	2.15	5.58	2.9	2.18	1.01	228	1.78
Melanoplus dawsoni Scudd.	0.02	1.57	0.12	12	12	12	12	12	4.37	53	53	0.41

Distribution by species of 12,772 specimens collected in South Dakota, expressed in percentage of total number collected in each habitat--Continued

Species	:Snall :Road.:Pas- :Leg- :Weeds:Range: :River:Environ-:Rever-:Mead- :Total : Percent- :grains:side :ture :umes :
---------	--

SOUTH DAKOTA

Small grains

Percent

1.	Melanoplus mexicanus -----	66
2.	Melanoplus bivittatus -----	5
3.	Melanoplus packardii -----	4
4.	Melanoplus differentialis ---	4
5.	Ageneotettix deorum -----	3
6.	Twenty-eight other species --	18
		Nymphs, 3.04

Range

Percent

1.	Aulocara elliotti -----	21
2.	Ageneotettix deorum -----	15
3.	Melanoplus mexicanus -----	15
4.	Melanoplus occidentalis -----	3
5.	Amphitornus coloradus -----	2
6.	Thirty-six other species ----	44
		Nymphs, 25.92

Roadside

1.	Melanoplus mexicanus -----	41
2.	Melanoplus femur-rubrum -----	11
3.	Melanoplus packardii -----	10
4.	Melanoplus bivittatus -----	6
5.	Ageneotettix deorum -----	3
6.	Twenty-nine other species ---	29
		Nymphs, 12.67

Meadow

1.	Melanoplus mexicanus -----	28
2.	Ageneotettix deorum -----	27
3.	Melanoplus femur-rubrum -----	6
4.	Melanoplus bivittatus -----	5
5.	Melanoplus dawsoni -----	4
6.	Twenty-three other species ---	30
		Nymphs, 8.74

Pasture

1.	Melanoplus mexicanus -----	45
2.	Ageneotettix deorum -----	14
3.	Aulocara elliotti -----	7
4.	Melanoplus femur-rubrum -----	5
5.	Aeoloplus turnbulli -----	5
6.	Twenty-eight other species --	24
		Nymphs, 2.75

Corn

1.	Melanoplus mexicanus -----	61
2.	Melanoplus packardii -----	8
3.	Melanoplus bivittatus -----	8
4.	Melanoplus differentialis ---	6
5.	Melanoplus lakinus -----	4
6.	Thirteen other species -----	13
		Nymphs, 1.01

Legumes

1.	Melanoplus mexicanus -----	52
2.	Melanoplus femur-rubrum -----	20
3.	Melanoplus bivittatus -----	6
4.	Ageneotettix deorum -----	5
5.	Melanoplus differentialis ---	5
6.	Twenty-nine other species ---	12
		Nymphs, 1.80

River bottom

1.	Melanoplus mexicanus -----	50
2.	Melanoplus bivittatus -----	9
3.	Melanoplus femur-rubrum -----	7
4.	Melanoplus foedus fluvialis ---	7
5.	Melanoplus confusus -----	6
6.	Twenty other species -----	21
		Nymphs, 0.23

Weeds

1.	Melanoplus mexicanus -----	38
2.	Melanoplus femur-rubrum -----	24
3.	Aulocara elliotti -----	8
4.	Ageneotettix deorum -----	5
5.	Melanoplus bivittatus -----	4
6.	Twelve other species -----	21
		Nymphs, 7.94

Environment not given

1.	Melanoplus mexicanus -----	49
2.	Melanoplus femur-rubrum -----	10
3.	Melanoplus bivittatus -----	7
4.	Aulocara elliotti -----	5
5.	Mermiria maculipennis -----	5
6.	Twenty other species -----	24
		Nymphs, 11.30



SOUTH DAKOTA -- Continued

<u>Reversion</u>		<u>Percentage of grand total</u>	
<u>Percent</u>			
1. Melanoplus mexicanus -----	46	1. Melanoplus mexicanus -----	46
2. Ageneotettix decorum -----	20	2. Ageneotettix decorum -----	8
3. Aulocara ellioti -----	11	3. Aulocara ellioti -----	7
4. Amphitornus coloradus -----	7	4. Melanoplus femur-rubrum -----	6
5. Aeoloplus turnbulli -----	4	5. Melanoplus bivittatus -----	4
6. Eleven other species -----	12	6. Fifty-two other species -----	29
Nymphs, 0			

TEXAS

Only 1,005 specimens were collected in Texas. This is not a fair sample of the hoppers for the largest State in the Union; therefore the relative numbers of the different species as shown here are not conclusive. Melanoplus differentialis was the dominant species along the Red River and in the central part of the State. Dissosteira longipennis was the most numerous species found in the extreme northwestern part, or Panhandle.

Distribution of species of 1,005 specimens collected in Texas, expressed in percentage of total

Distribution of species of 1,005 specimens collected in Texas, expressed in percentage of total number collected in each habitat

Species	Small : :grains	Range:side	Road:Grass:--:Environ--:Total : : land :ment not:speci--: age of	shown : mens :grand total	Number:
Aeoloplus turnbulli Thos.	1.20:	--	--	--	3
Aeneotettix decorum Thos.	40:	--	0.91:	--	5
Aulocara elliotti Thos.	14.00:	31.67:	14.16:	33.43	199
Cerdillacris crenulata Brun.	.80:	--	6.39:	--	16
Decticinae	--	5.00:	3.65:	--	8
Drepanopterna femoratum Scudd.	--	1.67:	1.37:	1.34	10
D. longipennis Thos.	40:	--	1.37:	.31	2
Encoptolophus pallidus subgracilis Caud.	--	--	--	1.23	5
Hedrotettix trifasciatus Say	--	1.67:	--	.31	5
Heper. speciosus Scudd.	--	--	2.67:	1.53	14
Melanoplus arizonae Scudd.	2.80:	--	.91:	--	5
Melanoplus bivittatus Say	2.40:	--	--	1.53	14
Melanoplus differentialis Thos.	50.40:	--	.91:	1.53	133
Melanoplus femur-rubrum Deg.	--	--	.46:	--	1
Melanoplus fluvialis Brun.	--	--	--	2.45	8
Melanoplus flavivus Scudd.	1.60:	--	--	--	4
Melanoplus impiger Scudd.	.80:	--	--	.31	3
Melanoplus lakirus Scudd.	6.00:	--	--	.92	19
Melanoplus mexicanus Sauss.	3.60:	1.67:	--	3.63	22
Melanoplus occidentalis Thos.	--	5.00:	--	--	3
Melanoplus packardii Scudd.	6.40:	1.67:	5.94:	7.05	59
Melanoplus regalis Dodge	1.60:	1.67:	6.39:	3.07	34
Mermiria maculipennis Brun.	--	--	2.74:	--	5
Mermiria sp.	--	--	--	.67	1
Nymphs	--	5.00:	6.39:	--	17
Opeie. obscura Thos.	--	--	1.83:	--	4
Phlibostroma quadrimaculatum Thos.	2.00:	35.00:	40.64:	85.32	366
Schistocerca lineata Scudd.	--	--	--	.61	2
Syrbula admirabilis Uhl.	--	--	--	.67	1
Spharagemon collaris Scudd.	.80:	--	.91:	.61	6
Spharagemon equale Say	--	--	--	.61	2
Trachyrhachis kiowa Thos.	4.40:	--	4.57:	2.76	33
Xanthippus corallipes Hald.	.40:	--	.46:	--	2
Total specimens per environment	250	60	219	150	1,005

Total specimens per environment

TEXAS

Small grains

	<u>Percent</u>
1. Melanoplus differentialis ---	50
2. Aulocara ellioti -----	14
3. Melanoplus packardii -----	6
4. Melanoplus lakinus -----	6
5. Trachyrhachis kiowa -----	4
6. Thirteen other species, adults	20
Nymphs, none	

Range

1. Phlibostroma quadrimaculatum	35
2. Aulocara ellioti -----	31
3. Melanoplus packardii -----	11
4. Drepanopterna femoratum -----	5
5. Melanoplus occidentalis -----	5
6. Five other species, adults	13
Nymphs, 5.	

Roadside

1. Phlibostroma quadrimaculatum	40
2. Aulocara ellioti -----	14
3. Melanoplus regalis -----	6
4. Cordillacris crenulata -----	6
5. Melanoplus packardii -----	5
6. Thirteen other species, adults	29
Nymphs, 6.37	

Grassland

	<u>Percent</u>
1. Phlibostroma quadrimaculatum	35
2. Aulocara ellioti -----	3
3. Melanoplus regalis -----	3
4. Hesper. speciosus -----	2
5. Trachyrhachis kiowa -----	2
6. Four other species, adults	5
Nymphs, none	

Environment not shown

1. Phlibostroma quadrimaculatum	37
2. Aulocara ellioti -----	33
3. Melanoplus packardii -----	7
4. Melanoplus mexicanus -----	3
5. Melanoplus regalis -----	3
6. Thirteen other species, adults	17
Nymphs, none	

Percentage of grand total

1. Phlibostroma quadrimaculatum	36
2. Aulocara ellioti -----	19
3. Melanoplus differentialis ---	13
4. Melanoplus packardii -----	5
5. Melanoplus regalis -----	3
6. Twenty-eight other species	24
Nymphs, 1.69	

UTAH

Of the 5,669 specimens collected in Utah, Melanoplus femur-rubrum formed 69 percent, with M. mexicanus second at 18 percent. The most severe infestations were in the north-central part of the State, alfalfa fields containing the most hoppers. M. femur-rubrum increased its importance over the other species from 28 percent in 1936 to 69 percent in 1937.

Distribution by species of 5,669 specimens collected in Utah, expressed in percentage of total number collected in each habitat

Species	Leg- umes	Small grains	Pas- ture	Corn	Range	Truck	Environ- ment	Total not speci- mens	Percent- age of grand total
<i>Agoneotettix deorum</i> Scudd.	0.14	---	---	---	---	---	---	7	0.12
<i>Arhina pseudonietna</i> Thos.	.69	.97	---	---	---	---	---	39	.69
<i>Aulocara elliptica</i> Thos.	.18	.19	---	---	---	---	---	10	.18
<i>Camula rellucida</i> Scudd.	.14	.58	20.24	---	7.69	---	---	28	.49
<i>Chorthippus longicornis</i> Latr.	.30	---	2.38	---	---	---	---	17	.30
<i>Dissosteira berolina</i> L.	.57	1.17	7.14	---	---	---	1.53	41	.72
<i>Dissosteira sparsata</i> Sauss.	.10	---	---	---	---	---	---	5	.09
<i>Drepanopterna femoratum</i> Scudd.	.16	.30	---	---	---	---	---	10	.18
<i>Hesperotettix viridis</i> Thos.	.03	---	---	---	---	---	---	4	.07
<i>Melanoplus bivittatus</i> Say.	1.93	1.75	2.38	---	7.69	---	9.46	116	2.04
<i>Melanoplus dawsoni</i> Scudd.	.16	---	---	---	---	---	---	8	.11
<i>Melanoplus differentialis</i> Thos.	.04	---	---	---	---	---	---	2	.04
<i>Melanoplus femur-rubrum</i> Deg.	.69	.99	53.57	36.17	23.08	93.33	---	3,908	63.78
<i>Melanoplus infantilis</i> Scudd.	.02	---	---	---	---	---	---	1	.02
<i>Melanoplus keckleri</i> lundus Dodge	1.03	3.90	---	2.13	---	---	---	72	1.27
<i>Melanoplus mexicanus</i> Sauss.	18.77	14.42	2.38	19.15	15.38	---	29.97	1,035	18.22
<i>Melanoplus packardii</i> Scudd.	3.41	3.90	2.38	6.38	15.38	---	50.47	228	4.01
<i>Mermiria maculipennis</i> Brun.	.02	---	---	---	---	---	3.15	3	.05
<i>Oryzulella deserti</i> Scudd.	.02	---	2.38	---	---	---	---	3	.05
<i>Phaetaliotes nebrascensis</i> Thos.	.33	---	---	---	---	---	4.73	22	.39
<i>Pseudopomala brachyptera</i> Scudd.	.02	---	---	---	---	---	---	1	.02
<i>Schistocerca lineata</i> Scudd.	.10	.19	---	36.17	---	6.67	---	24	.42
<i>Spharagemon collaris</i> Say.	.02	.19	1.19	---	---	---	---	3	.05
<i>Spharagemon equalis</i> Say.	.02	.19	---	---	---	---	---	2	.04
<i>Trachyrhachis kiowa</i> Thos.	.24	---	---	---	---	---	---	12	.21
<i>Trimerotropis pallidipennis</i> Burm.	.59	1.17	5.95	---	23.08	---	---	43	.77
<i>Trimerotropis gracilis</i> Thos.	---	---	---	---	7.69	---	---	1	.02
<i>Trimerotropis strenua</i> McN.	.12	---	---	---	---	---	---	6	.11
Nymphs	.36	---	---	---	---	---	---	18	.32
Total specimens per environment	4,934	513	84	47	13	15	63	5,669	---



UTAH

<u>Legumes</u>		<u>Range</u>	
	<u>Percent</u>		<u>Percent</u>
1. Melanoplus femur-rubrum ----	70	1. Melanoplus femur-rubrum -----	23
2. Melanoplus mexicanus -----	19	2. Trimerotropis pallidipennis --	23
3. Melanoplus packardii -----	3	3. Melanoplus mexicanus -----	15
4. Melanoplus bivittatus -----	2	4. Melanoplus packardii -----	15
5. Melanoplus keeleri luridus -	1	5. Cammula pellucida -----	8
6. Twenty-two other species ----	5	6. Two other species -----	16
Nymphs, 0		Nymphs, 0	

<u>Small grains</u>		<u>Truck crops</u>	
1. Melanoplus femur-rubrum ----	71	1. Melanoplus femur-rubrum -----	93
2. Melanoplus mexicanus -----	14	2. Schistocerca lineata -----	7
3. Melanoplus keeleri luridus -	4	Nymphs, 0	
4. Melanoplus packardii -----	4		
5. Melanoplus bivittatus -----	2		
6. Nine other species -----	5		
Nymphs, 0			

<u>Pastures</u>		<u>Environment not given</u>	
1. Melanoplus femur-rubrum ----	54	1. Melanoplus packardii -----	50
2. Cammula pellucida -----	20	2. Melanoplus mexicanus -----	30
3. Dissosteira carolina -----	7	3. Melanoplus bivittatus -----	9
4. Trimerotropis pallidipennis	6	4. Phoetaliotes nebrascensis --	5
5. Chorthippus longicornis ----	2	5. Mermiria maculipennis -----	3
6. Five other species -----	11	6. One other species -----	2
Nymphs, 0		Nymphs, 0	

<u>Corn</u>		<u>Percentage of grand total</u>	
1. Melanoplus femur-rubrum ----	36	1. Melanoplus femur-rubrum ----	69
2. Schistocerca lineata -----	36	2. Melanoplus mexicanus -----	18
3. Melanoplus mexicanus -----	19	3. Melanoplus packardii -----	4
4. Melanoplus packardii -----	6	4. Melanoplus bivittatus -----	2
5. Melanoplus keeleri luridus --	2	5. Melanoplus keeleri luridus --	1
Nymphs, 0		6. Twenty-four other species --	6
		Nymphs, 0.32	

WISCONSIN

Only a few specimens were collected in Wisconsin in 1937. Of the 242 taken, Melanoplus mexicanus was the most numerous. This was substantiated by the hatch in 1938 which showed M. mexicanus to be dominant over a large part of the State. M. femur-rubrum was second in importance. The infestations were in threatening numbers over most of the State, except in a few central counties.

Distribution by species of 242 specimens collected in Wisconsin, expressed in percentage of total number collected in each habitat

Species	Pasture: (stump)	Meadow:	Roadside:	Total specimens:	Percentage of Grand total
Carmula pellucida Scudd.	2.00	2.08	--	4	1.65
Chort. longicornis Harr.	1.00	2.05	2.17	4	1.65
Melanoplus bivittatus Say	--	--	2.17	1	0.41
Melanoplus dawsoni Scudd.	--	3.13	--	3	1.24
Melanoplus femur-rubrum Deg.	71.00	4.17	13.04	81	33.47
Melanoplus mexicanus Sauss.	26.00	53.54	52.61	149	61.57
Total specimens per environment	100	96	46	242	--

<u>Pasture (stump)</u>		<u>Roadside</u>	
	<u>Percent</u>		<u>Percent</u>
1. <i>Melanoplus femur-rubrum</i> ----	71	1. <i>Melanoplus mexicanus</i> -----	83
2. <i>Melanoplus mexicanus</i> -----	26	2. <i>Melanoplus femur-rubrum</i> ----	13
3. <i>Cammula pellucida</i> -----	2	3. <i>Chort. longicornis</i> -----	2
4. <i>Chort. longicornis</i> -----	1	4. <i>Melanoplus bivittatus</i> -----	2
No other species		No other species	
<u>Meadow</u>		<u>Percentage of grand total</u>	
1. <i>Melanoplus mexicanus</i> -----	39	1. <i>Melanoplus mexicanus</i> -----	61
2. <i>Melanoplus femur-rubrum</i> ----	4	2. <i>Melanoplus femur-rubrum</i> ----	33
3. <i>Melanoplus dawsoni</i> -----	3	3. <i>Cammula pellucida</i> -----	2
4. <i>Cammula pellucida</i> -----	2	4. <i>Chort. longicornis</i> -----	2
5. <i>Chorthippus longicornis</i> ----	2	5. <i>Melanoplus dawsoni</i> -----	1
		6. One other species-----	1

#### WYOMING

The collections for Wyoming were the most complete of all. There were 37,628 specimens collected, of which *Melanoplus mexicanus* was first in numbers, *M. femur-rubrum* second, *M. bivittatus* third, and *Cammula pellucida* fourth. Severe infestations were present in 12 counties in the northern and eastern parts of the State where most of the farming is done. There was practically no change over 1936 in the relative numbers of the first three important species. Rains in the first 2 weeks of June held outbreaks in check.

Distribution by species of 37,628 specimens collected in Wyoming, expressed in percentage of total number collected in each habitat

Species	Leg- umes	Small grains	Range: side	Road- ver- sion	Re- River	Mixed fields	Pas- ture	Weeds and Idle land	Aban- doned field	Env. not shown	Spec- imens	Percent- age of grand total
Aeoloplus turnbulli Thos.	0.95	2.83	0.72	14.99	13.42	0.29	0.74	0.29	0.90	1.63	--	1.79
Acrolophitus hirtipes Say	--	.04	--	--	--	.03	--	--	--	--	1,690	.02
Agonectettix deorum Scudd.	.73	1.99	11.59	2.51	1.57	6.55	7.13	6.95	4.04	9.59	7.49	4.02
Aeropedellus clavatus Thos.	--	--	.04	--	--	--	--	.07	--	--	--	.01
Arphia pseudonietana Thos.	.02	--	.02	--	--	.03	--	.14	--	--	--	.02
Aulaccara ciliolotti Thos.	1.30	4.36	17.75	4.63	1.34	12.73	7.01	3.51	2.70	7.69	10.77	6.06
Anabrus simplex Held.	--	--	--	--	--	--	--	--	--	--	--	.01
Amphitornus coloradus Thos.	.11	.49	2.21	.03	.45	1.07	.74	2.29	--	1.09	--	.71
Brachystola magna Gir.	.61	--	--	--	--	.05	--	--	--	--	6.45	.01
Bruneria brunnea Thos.	--	.04	2.20	--	--	.03	2.83	.07	--	--	--	.43
Boopodon sp.	--	.01	--	--	--	--	--	--	--	--	--	.02
Gamula pellucida Scudd.	5.97	7.65	4.95	17.41	--	7.60	12.36	21.91	45.29	9.96	12.90	7.68
Chorthippus longicornis Latr.	.17	.03	.17	.39	--	.16	1.17	1.15	.45	.54	--	.23
Cordillacris crenulata Brun.	.01	--	1.70	.03	--	.10	--	.07	--	--	--	.25
Cratypedes neglectus Thos.	--	--	.11	--	--	.03	--	--	--	.09	--	.02
Cord. occipitalis Thos.	--	.02	2.29	1.02	--	.13	.06	--	--	--	--	.38
Derotmema Haydenii Thos.	.26	.32	.89	.31	.89	.18	.49	.21	.45	.27	--	.36
Dissosteira caroline L.	.65	.57	.08	.08	.22	.29	.12	--	--	--	--	.41
Drepanopterna femoratum Scud.	.08	.21	4.10	.08	--	2.56	.37	1.22	2.24	.63	--	1.02
Dactylotum pictum Thos.	.01	--	.04	--	--	.03	--	.21	--	--	--	.02
Encoptolophus sordidus	--	--	--	--	--	--	--	--	--	--	--	--
cectalis Scudd.	.07	--	.43	--	--	.86	.12	2.22	--	--	--	.26
Hadrotettix trifasciatus Say	.14	.30	.96	1.02	.45	.68	.49	.43	--	--	4.84	.42
Hesperotettix viridis Thos.	.12	.26	2.12	.08	.22	.37	.37	.21	--	--	--	.49
Hypochlora alba Dodge	.01	--	.04	--	--	.18	.06	--	2.69	.09	--	.05
Melanoplus angustipennis	--	--	--	--	--	--	--	--	--	--	--	--
Dodge	3.02	3.99	.36	3.84	8.50	2.44	6.46	.29	6.28	1.45	3.28	2.84
Melanoplus alpinus Scudd.	--	0	.13	--	--	--	--	--	--	--	--	.03
Melanoplus bivittatus Say	15.74	7.16	.89	6.35	6.04	12.63	14.76	12.03	1.79	4.25	1.87	10.17
Melanoplus bruneri Scudd.	--	--	.55	--	--	1.07	--	.72	--	--	--	.21
Melanoplus bowditchi Scudd.	.69	.70	.96	.47	.45	--	1.75	.90	2.08	.47	--	.62
Melanoplus borealis Fieber	--	--	.06	.47	--	--	--	6.30	--	--	--	.62
Melanoplus confusus Scudd.	.05	.01	.15	.08	.03	.03	.03	.29	1.09	--	--	.09
Melanoplus dawsoni Scudd.	.08	.01	.25	.08	.10	.13	.06	.43	.63	--	--	.12
Melanoplus differentialis Thos.	2.26	2.63	--	.24	1.12	.42	.06	.64	.09	--	--	1.46



Distribution by species of 37,623 specimens collected in Wyoming, expressed in percentage of total number collected in each habitat--C continued

Species	Leg-:Small	Grains:Range:side	Road-:Rever-:bot-:River:	Mixed: fields: cws	Mead-:Pas-:ture:sage	Weeds: end	Idle: field: shown	Aban-: done: field: shown	Env-: not shown	Speci-: mens	Percent-: age of grand total
Melanoplus flavus Scudd.	0.05	0.13	0.55	0.18	---	---	---	---	---	21	0.05
Melanoplus femur-rubrum	---	---	---	---	---	---	---	---	---	---	---
Des.	24.17	10.62	1.57	10.35	1.79	15.98	6.52	9.38	1.35	6.24	14.19
M. f. f. Scudd.	1.86	3.6	2.04	13.20	3.9	3.9	1.72	3.6	---	3.6	1.34
Melanoplus gladstoni Scudd.	40	57	61	24	---	13	12	50	---	27	40
Melanoplus fluvialis	---	---	---	---	---	---	---	---	---	---	---
Bruner	04	---	---	---	22	16	---	---	---	12	03
Melanoplus infantilis	---	---	---	---	---	---	---	---	---	---	---
Scudd.	65	1.32	5.09	63	1.79	1.76	37	50	90	1.72	2.34
Melanoplus keeleri	---	---	---	---	---	---	---	---	---	---	---
luridus Dodge	---	---	---	---	---	---	---	---	---	---	---
Melanoplus kernicotti Scudd.	03	68	---	---	---	---	---	---	---	09	01
Melanoplus mexicanus	---	---	---	---	---	---	---	---	---	---	10
Sauss.	23	41.71	12.34	21.32	31.77	19.89	26.57	10.74	21.97	30.86	67.55
Melanoplus occidentalis	---	---	---	---	---	---	---	---	---	---	---
Thos.	08	48	3.70	1.02	1.34	1.26	31	29	45	1.18	---
Melanoplus packardii	---	---	---	---	---	---	---	---	---	---	---
Sauss.	4.11	4.27	2.74	2.59	9.84	2.75	3.32	1.36	90	5.52	3.28
Melanoplus sp.	---	---	3.08	---	---	---	---	---	---	---	---
Melanoplus oregonensis	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Merniria maculipennis Brun.	---	---	---	---	---	---	---	---	---	---	---
Merniria maculipennis	---	---	---	---	---	---	---	---	---	---	---
macclungi Rehn.	---	---	---	---	---	---	---	---	---	---	---
Metator pardalinus Sauss.	11	43	1.98	1.18	---	---	---	---	---	---	---
Nopodismopsis abdominalis	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Orthulella speciosa Scudd.	---	---	21	---	---	---	06	---	---	---	---
Orthulella pelidna Burn.	02	---	---	31	---	---	---	2.00	---	---	---
Opeia obscura Thos.	19	01	02	1.88	22	1.05	06	57	---	---	---
Pardalophora haldemani	---	---	---	---	---	---	---	14	90	27	---
Scudd.	---	01	08	---	---	---	---	---	45	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
Scudd.	---	---	---	---	---	---	---	---	---	---	---
Thos.	---	---	---	---	---	---	---	---	---	---	---
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Scudd.	---	---	---	---							

Species	Legs: Small	Grains: Range	Road: side	Rever: sion	Rever: bot- tom	River:	Mixed fields	Mead- ows	Pas- ture	Weeds:	Ahan- done:	Env.:	Speci- mens	age of grand total
Philibostroma quadri- maculatum Thos.	0.01	0.08	5.71	0.31	1.12	0.53	0.25	0.72	---	0.54	---	---	362	0.94
Phoetaliotes nebras- censis Thos.	0.03	0.05	1.3	0.03	---	0.53	---	0.29	---	0.09	---	---	51	0.13
Pseudopomalo brachyptera Scudd.	---	0.02	0.02	---	---	---	---	---	---	---	---	---	1	0.01
Schistocerca lineata Scudd.	---	0.03	0.03	---	---	---	0.06	1.29	---	---	---	---	23	0.06
Spharagemon collaris Scudd.	0.48	0.92	1.3	0.31	2.91	0.71	1.41	---	---	0.18	0.23	---	217	0.56
Spharagemon equale Say.	0.05	0.19	0.55	0.39	0.45	0.24	0.12	0.07	---	0.27	0.47	---	75	0.20
Tettigoniidae	0.03	---	---	---	---	---	---	---	---	---	---	---	11	0.03
Trachyrhachis kiowa Thos.	0.03	0.09	1.74	0.24	---	0.63	0.16	0.93	1.79	0.27	---	---	160	0.42
Trimerotropis sparsa Thos.	---	---	0.04	---	---	0.03	---	---	---	---	---	---	3	0.01
Trimerotropis laticincta Sauss.	0.01	0.04	---	0.31	---	---	0.06	---	---	---	0.23	---	11	0.03
Trimerotropis campestris McN.	---	---	---	---	---	---	---	---	---	0.09	---	---	1	0.01
Trimerotropis palli- dipennis Burm.	---	0.01	---	---	---	---	---	---	---	---	---	---	3	0.01
Trimerotropis pistrinaria Sauss.	---	0.02	0.02	0.03	---	---	0.06	---	---	---	---	---	3	0.01
Trimerotropis gracilis Thos.	---	---	---	---	---	---	---	1.35	---	---	---	---	3	0.01
Nymphs	11.95	3.01	0.91	1.88	0.45	---	---	1.43	1.35	1.99	---	---	2,059	5.35
Undetermined	0.01	---	---	---	---	---	---	---	---	---	---	---	1	0.01
Anabrus simplex Held.	---	---	---	---	0.22	---	---	0.07	---	---	---	---	2	0.01
Total specimens per environment	14.24	7,704	5,268	1,274	447	3,816	1,624	1,396	223	1,104	427	62	59	37,628

WYOMING

Legumes

	<u>Percent</u>
1. Melanoplus femur-rubrum -----	24
2. Melanoplus mexicanus -----	23
3. Melanoplus bivittatus -----	16
4. Cammula pellucida -----	6
5. Melanoplus packardii -----	4
6. Thirty-nine other species ----	27
Nymphs, 11.95	
Undetermined adults, 0.01	

Small grains

1. Melanoplus mexicanus -----	42
2. Melanoplus femur-rubrum -----	11
3. Cammula pellucida -----	8
4. Melanoplus bivittatus -----	7
5. Melanoplus packardii -----	4
6. Thirty-eight other species -	28
Nymphs, 3.01	
Undetermined, 0	

Range

1. Aulocara ellioti -----	18
2. Melanoplus mexicanus -----	12
3. Ageneotettix deorum -----	12
4. Phib. quadrimaculatum -----	6
5. Cammula pellucida -----	5
6. Fifty-one other species ----	47
Nymphs, 0.91	
Undetermined adults, 0	

Roadside

1. Melanoplus mexicanus -----	21
2. Cammula pellucida -----	17
3. Acolopius turnbulli -----	15
4. Melanoplus femur-rubrum ----	10
5. Melanoplus bivittatus -----	6
6. Thirty-four other species --	31
Nymphs, 1.38	
Undetermined adults, 0	

River bottom

	<u>Percent</u>
1. Melanoplus mexicanus -----	20
2. Melanoplus femur-rubrum ----	17
3. Aulocara ellioti -----	13
4. Melanoplus bivittatus -----	13
5. Cammula pellucida -----	8
6. Forty other species -----	29
Nymphs, 0	
Undetermined adults, 0	

Mixed fields

1. Melanoplus mexicanus -----	27
2. Melanoplus bivittatus -----	15
3. Cammula pellucida -----	12
4. Aulocara ellioti -----	7
5. Ageneotettix deorum -----	7
6. Thirty-three other species	32
Nymphs, 0	
Undetermined, 0	

Meadows

1. Cammula pellucida -----	22
2. Melanoplus bivittatus -----	12
3. Melanoplus mexicanus -----	11
4. Melanoplus femur-rubrum ----	9
5. Metator pardalinus -----	7
6. Thirty-seven other species	39
Nymphs, 1.43	
Undetermined adults, 0	

Pasture

1. Cammula pellucida -----	45
2. Melanoplus mexicanus -----	22
3. Melanoplus angustipennis --	6
4. Ageneotettix deorum -----	4
5. Aulocara ellioti -----	3
6. Seventeen other species ----	20
Nymphs, 1.35	
Undetermined adults, 0	



WYOMING---(Continued)

Reversion

	<u>Percent</u>
1. <i>Melanoplus mexicanus</i> -----	32
2. <i>Melanoplus foedus foedus</i> ----	13
3. <i>Aeoloplus turnbulli</i> -----	13
4. <i>Melanoplus angustipennis</i> ----	9
5. <i>Melanoplus bivittatus</i> -----	6
6. Twenty other species -----	27
Nymphs, 0.45	
Undetermined adults, 0	

Idle land

1. <i>Melanoplus mexicanus</i> -----	68
2. <i>Aulocara ellioti</i> -----	11
3. <i>Ageneotettix deorum</i> -----	7
4. <i>Melanoplus packardii</i> -----	3
5. <i>Melanoplus angustipennis</i> ----	3
6. Ten other species -----	8
Nymphs, 0	
Undetermined adults, 0	

Environment not shown

1. <i>Melanoplus mexicanus</i> -----	80
2. <i>Camnula pellucida</i> -----	7
3. <i>Melanoplus bivittatus</i> -----	5
4. <i>Melanoplus packardii</i> -----	5
5. <i>Aulocara ellioti</i> -----	3
6. No other species	
Nymphs, 0	
Undetermined adults, 0	

Weeds and Sago

	<u>Percent</u>
1. <i>Melanoplus mexicanus</i> -----	31
2. <i>Camnula pellucida</i> -----	10
3. <i>Ageneotettix deorum</i> -----	10
4. <i>Aulocara ellioti</i> -----	8
5. <i>Melanoplus femur-rubrum</i> -----	6
6. Thirty-five other species ----	35
Nymphs, 0	
Undetermined adults, 0	

Abandoned land (fields)

1. <i>Aulocara ellioti</i> -----	27
2. <i>Ageneotettix deorum</i> -----	26
3. <i>Camnula pellucida</i> -----	13
4. <i>Melanoplus mexicanus</i> -----	13
5. <i>Amphitornus coloradus</i> -----	6
6. Four other species -----	15
Nymphs, 0	
Undetermined adults, 0	

Percentage of grand total

1. <i>Melanoplus mexicanus</i> -----	25
2. <i>Melanoplus femur-rubrum</i> -----	14
3. <i>Melanoplus bivittatus</i> -----	10
4. <i>Camnula pellucida</i> -----	8
5. <i>Ageneotettix deorum</i> -----	4
6. Sixty-eight other species ----	39
Nymphs, 5.35	
Undetermined adults, .01	

SUMMARY

The most spectacular event of the 1937 outbreak was the infestation of *Dissosteira longipennis* in Colorado, New Mexico, and Texas. The most interesting from an entomological standpoint was the second generation of *Melanoplus mexicanus*, which began hatching about August 20 and actually produced a second outbreak of hoppers in the winter-wheat sections. This species has steadily advanced in its importance over other species since 1933. There are, however, fairly well defined areas where certain species are dominant. *Melanoplus femur-rubrum* is now dominant in the areas comprising northeastern Iowa, south-eastern Minnesota, southern Wisconsin, northern Illinois, Idaho, and Utah. *M. differentialis* is dominant or very important in southern Iowa, northern Missouri, eastern Kansas, eastern Nebraska and most of Oklahoma and Texas. *M. mexicanus* is the most important species in the Dakotas, western Nebraska, Kansas, and most of Montana and Wyoming. *Dissosteira longipennis* is by far the dominant species in the northeastern counties of New Mexico, the Western Panhandle of Texas, the Panhandle of Oklahoma, and southeastern counties of Colorado. *Camnula pellucida* was of local importance in the States farthest north.



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